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ABSTRACT

Greater concern with unemployment in recent years has increased the need for accurate forecasting of future labor market requirements, in order to plan for vocational education and other manpower programs. However, past emphasis has been placed on labor demand, rather than supply, even though either side by itself is useless in determining skill shortages. This report seeks to resolve this problem by analyzing the labor market in terms of specific sources of future supply. With careful definition of categories minimizing double-counting, and with accuracy improved by comparing the summed source estimates with separately derived aggregate labor force projections, the study provides the means to consider supply, as well as demand, in the labor market. (BH)

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FORECAST OCCUPATIONAL SUPPLY:
A METHODOLOGICAL HANDBOOK

Technical Report Number 4

by

Bruce McKinlay

and

Lowell E. Johnson

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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MANPOWER RESEARCH PROJECT
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CHAPTER I

INTRODUCTION: THE FORECASTING OF MANPOWER SUPPLY

Recent attention to employment problems has greatly increased the amount of labor market information required for vocational counseling, vocational education, employment development, and other manpower programs. As a result, public programs have joined individual decision making as prime users of labor market information. Public programs planners, as well as both firms and individuals, make decisions based on their view of the labor market, and these decisions affect, in a large part, the working of that market.

Of all types of labor market information, occupational supply and demand information is some of the most relevant for these purposes. The major objective of occupational labor market information is to evaluate job opportunities in relation to available labor supply in particular occupations. Such an evaluation involves a study of the number and characteristics of the present and anticipated labor supply compared to occupational labor demand. Any meaningful analysis of employment problems depends on information about both sides of the labor market—labor supply and labor demand. To date the supply side of the labor market has received much less emphasis, with the result that the measurement of labor supply has been in a much more primitive stage than has the measurement of demand.

Attempts to estimate future supply for occupations are made especially difficult by the character of American labor markets. The American labor force is highly flexible, with most workers capable of filling any of a large number of occupations. Correspondingly, hiring requirements for most occupations are flexible within a reasonably wide range. In this open system, people move, if not freely, at least with relative frequency from one occupation to another and from one labor market area to another. The geographic and occupational mobility of the labor force are important in moderating or eliminating imbalances in occupational supply and demand, but they make forecasting a very difficult job indeed. Moreover, the priority place on "general" education and the large attrition from the educational system result in large numbers of new labor force entrants lacking specific vocational preparation, a fact which complicates forecasting their probable occupational attachment.

An inadequate supply of fundamental data on which to base forecasts is another major problem in the development of occupational supply projections. Not only is information largely unavailable about such informal processes as geographic and occupational mobility, but formal supply-producing institutions are sorely lacking in their ability to describe the size or character of their contributions to labor supply.

Facts such as these have historically led labor market analysts to avoid supply forecasting entirely, or to treat only small portions of it. Occasionally the implicit assumption has been made that the measurable components comprised the sum and substance of occupational supply—an assumption which has too often resulted in seriously misleading conclusions. With financial assistance from the U.S. Department of Labor's Bureau of Employment Security, the Oregon Manpower Research Project has worked to define the various components of occupational supply and to develop methodologies for quantifying each of these components. The results of the Oregon project are contained in this Handbook.

The methodology outlined here makes two substantial additions to existing supply estimating capabilities. First, it provides a systematic, procedural statement of the means for assessing the adequacy and changing personal characteristics of the total labor supply (Chapter II). The resulting aggregate information provides some analytically useful information in its own right, but it also greatly facilitates the interpretation of detailed, occupational data by revealing whether overall manpower shortages or surpluses are likely.

The second and more original contribution of this methodology is the measurement of the output from several sources of future supply which have heretofore gone unquantified. Traditionally, only the currently unemployed, vocational training program graduates, and female labor force re-entrants have been empirically measured in occupational studies. Now, however, it is also possible to estimate the supply of labor which will be provided by the graduates of high school and college "general education" programs, by high school and college drop-outs, by young men returning from military service, and by geographic migrants (Chapter III). These sources constitute a complete model of the total supply of labor to a labor market. The remaining source of supply for individual occupations is occupational transfers, which affects the distribution of manpower among occupations, but has no impact on the total supply of labor. It is dealt with in the supply allocation process.

The supply source methodology which is presented here makes a number of demands on the labor market analyst. First, it requires careful and consistent definition of the supply source categories, lest some supply be counted twice and some not at all. The supply sources are defined operationally as their methodologies are presented; nevertheless, an example of the definitional problems may help clarify the need for precision. A young man may graduate from high school, begin a general college program, but drop out to join the armed services. After leaving the military he may complete a vocational training program before seeking employment. All of these activities could conceivably take place during a given forecast period. In order to avoid counting such individuals at each source, the methodology counts them only at the source from which they enter the labor market, in this case the vocational training program. This process requires not only an estimate of the number of people emerging from each source, but also attention to their immediate action vis a vis the labor market.

Another problem of double-count arises from the fact that schools, social agencies, and employers are all asked to report vocational trainees, and all three may report some of the same people. Procedures for avoiding this double counting of vocational trainees are included in the methodology. In addition, special treatment of employed persons who are also attending school programs is required.

Besides a precise and consistent definition of the supply categories, this methodology requires more time and effort than has traditionally been allocated to the estimation of supply in occupational studies. The large task of collecting and processing occupational employment data ordinarily occupies most of the effort of such studies. However, it should be re-emphasized that adequate supply data are essential to valid supply and demand comparisons, and that more complete data require more effort than the partial data ordinarily developed. Fortunately, it has been possible to minimize the time required to calculate the additional supply sources. Very little field survey work is required beyond the collection of data from vocational training institutions, and the additional effort required to develop complete supply information is limited. It is now possible to treat the supply analysis as a major component of an occupational study, and it is feasible to devote appropriate effort to it.

Because the methodology yields two sets of supply data--the projected labor supply developed from population data and the estimated output of the various supply sources--it becomes necessary to reconcile the two before analysis can actually be undertaken. This reconciliation is necessary because the two approaches to estimating supply, while they are interrelated and both are essential, may initially yield slightly different supply totals. Procedures for making the reconciliation are included in this handbook (Chapter IV).

Once a consistent set of supply totals has been developed, the methodology makes it possible to determine the occupations for which the additional workers can most appropriately be considered as supply (Chapter V). Thus, by working from supply totals through the allocation process, it is possible to produce corresponding supply data for individual occupations.

It should be noted that every procedure suggested here, except the procedure for estimating occupational transfers, has been field tested to resolve as many procedural problems as possible and to evaluate the results before the procedure was written into the Handbook. In order to make the Handbook more generally relevant, the data used to test the procedures have usually not been included; however data and other references to the project area, the Eugene Standard Metropolitan Statistical Area (Lane County, Oregon), have been included where they substantially aid the presentation or when data from the project area may be applicable to other areas.

It will be noted that some of the supply estimating methodologies, especially those having to do with allocation to specific occupations, rely upon occupational demand data. Since this handbook is intended for operational use in the Employment Security system, where occupational demand estimates have traditionally relied on employer surveys, the procedures are described in terms of demand data generated by an employer survey. Nevertheless, the supply methodology presented here is perfectly compatible with demand data generated in other ways, so long as the data describe a complete demand system—expansion demand, replacement demand, and current vacancies—and yield information about the age and sex of employed persons. Whatever type of demand data are used, it is essential, for supply estimating purposes as well as for the analysis, to use the same occupational classification system on both the demand and the supply sides.

CHAPTER II

PROJECTING POPULATION AND WORK FORCE

The publication, Personal Characteristics of the Work Force: A Methodological Handbook for Use in Oregon Labor Market Areas, provides a methodology for distributing any past or current work force estimate by age and sex. In a study of future occupational supply, it is also necessary to project the size of the work force by age and sex. That methodology is relevant here for several reasons. First, the personal characteristics of the forecast work force are useful in their own right, for such estimates are a valuable guide to future supply conditions. Second, the re-application of the Personal Characteristics Handbook as described in this chapter actually yields a total work force figure derived from an independent population forecast. Third, the data make possible a methodology for estimating net work force migration.

The following is a brief, item-by-item procedural outline of the methodology for projecting the work force. Essentially, this involves a re-application of the methodology contained in the Personal Characteristics Handbook cited above. The most distinctive feature of the re-application for the forecast work force, as opposed to the initial application for the current year work force, is that the re-application actually yields a total work force forecast figure as well as a distribution by age and sex. Because the forecast is based on a population figure, it focuses the analysis on the difference between the labor supply generated by the population and the labor demand generated by employment.

The development of the projected work force estimates requires current year data of the type developed in the Personal Characteristics Handbook. Therefore, the first step in developing the forecasts is to make estimates for the current year (where the current year is the year in which the survey was conducted) by applying the Personal Characteristics Handbook. The projection methodology presented here, aside from requiring data developed in the application of the Personal Characteristics Handbook, presupposes a thorough understanding of that methodology, and it is written as a companion to that Handbook.

Section A.

Selection of a Population Forecast

The procedure presented here requires only a forecast of total population in addition to the data already developed in preparing the current age-sex estimates of the work force. The choice of a population forecast, however, requires considerable judgement on the part of the analyst. As is typically the case in this country, the study area has no recent official population forecasts to match the estimates of current population which are prepared annually. Consequently, it is necessary to select one of the forecasts available from other research organizations in the area or to develop an original one.

Step 1. Collection.—The first appropriate step is to obtain whatever population forecasts have recently been made for the area. Planning commissions, industrial development commissions, large public utilities, and other research organizations sometimes have such forecasts. Some of the recent regional studies also contain population for subregions. The U.S. Census Bureau is now making population projections for states which may also be useful. In collecting these forecasts, it is important to note their benchmark years and the general outlines of the methodologies used to develop the forecasts.

Step 2. Evaluation.—A decision to use a forecast should be made only after evaluating the usefulness of the figures for the purposes of manpower projections. Specific procedures for evaluating forecasts are hard to develop, but a few general guidelines can be offered.

It is obvious that the economic assumptions underlying the population forecasts should not depart radically from those used in the occupational analysis. In addition, forecasts should be reviewed to see whether their methodology is based on direct analysis of population variables or whether some are calculated as a function of a set of employment variables.[1] One useful way of appraising alternative forecasts is to compare them to historical population trends. Decennial Census of Population data are available for over a hundred years, and plotting such a long-run series is sometimes highly instructive. In Eugene, Oregon, for instance, such a long-term analysis revealed that population had been growing very consistently throughout the hundred year period--at a geometric rate. This kind of knowledge provides another frame of reference for the evaluation of alternative population forecasts.

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[1] This point is important because the migration component of population forecasts is frequently based upon employment demand considerations and therefore tends to obscure labor market imbalances, which are the principal issue of the occupational analysis. For a fuller discussion of this point, see Bruce McKinlay, "Sources of Population Data for Area Manpower Requirements and Resources Surveys," (Oregon Department of Employment: Manpower Research Project) September 1967, pp. 4-6 in the Appendix.

Step 3. Selection.--The most appropriate population forecast to select will be one in which the assumptions are not in conflict with those of the rest of the manpower study. Since the purpose of the entire occupational analysis is to compare the labor supply likely to be generated by the population to the demand expected to be created by expansion and replacement, the most appropriate population forecast will also be one in which the methodology principally reflects demographic factors, rather than employment demand factors. Further, it will most likely be one which is consistent with past population trends, unless there is some reason to expect a significant departure from past trends.

If no population forecasts are available for the area, or if none is suitable for the study, it may be necessary for the analyst to make his own forecast. If this alternative is chosen, preference should be given to a projection which principally reflects past trends among population variables.

Section B

Distributing the Population Forecast by Age and Sex

Once a population projection has been chosen, the method for distributing it by age and sex is procedurally the same as the process for distributing the current year population as outlined in Worksheet 1, "Distributing Desired Year County Population by Age and Sex," in the Personal Characteristics Handbook.

The following instructions presuppose the prior use of the Handbook; they require use of the format and reference to the discussion of Worksheet 1 on pages 13 to 18 of the Personal Characteristics Handbook.

Instructions for

WORKSHEET II-1: DISTRIBUTING FORECAST YEAR STUDY AREA POPULATION BY AGE AND SEX

Columns I-II Distributing Base Year County Population by Age and Sex and Removal of College Population

Note: The base year remains the same for the forecast reapplication as for the initial, current year application of the methodology; therefore both the procedure and the data will be the same as in the Personal Characteristics Handbook.

Columns III-VII Calculating the State Percentage Distribution Change

Note: The "desired year" in this case is the forecast year; the procedure is exactly the same as for the current year. The base year remains unchanged.

Source: Appendix A to the Personal Characteristics Handbook.

Columns VIII-X Distributing Desired Year County Population by Age and Sex

Note: The procedure for the forecast reapplication is again the same as it was for the current year application. The one important difference concerns the estimate of Total Population (Column X). In the initial application, the Study Area population data were to be obtained from the state agency responsible for population estimating, which in Oregon is the Center for Population Research and Census at Portland State College. In the forecast year reapplication, the forecast population will have to be obtained from another source (see the discussion of "Selection of a Population Forecast," Section A. of this chapter) since forecasts are not available from the Center for Population Research and Census.

Forecast student population, where the use of such data is required, must also be obtained. These will generally be available from the individual school, or from the State System of Higher Education.

It will not be necessary to adjust for major military population here unless military population is expected to change at a substantially different rate than the total population (see Personal Characteristics Handbook, page 11).

Section C.

Deriving a Forecast Work Force Estimate Distributed by Age and Sex

The development of a work force projection follows from the above population data and the data developed in the application of the Personal Characteristics Handbook to the current year. The procedure is enough different from that contained in Worksheet 2, "Desired Year County Work Force

Distributed by Age and Sex," of the Personal Characteristics Handbook, that a new worksheet is presented below. Except for the fact that an independent work force total is not introduced here, the basic methodology remains essentially unchanged. The analyst may find reference to the Personal Characteristics Handbook useful in applying the procedures described below.

Instructions for

WORKSHEET II-2: DERIVING STUDY AREA FORECAST WORK FORCE ESTIMATE DISTRIBUTED BY AGE AND SEX

Column I Current Year Study Area CES Participation Rates

Source: These rates should be obtained from the Personal Characteristics Handbook, Worksheet 2, Column X, "Desired Year CES Participation Rates."

Note: "CES" refers to the Current Employment Statistics program which is operated by each Employment Service agency in cooperation with B.L.S. For the purpose of deriving the forecast CES participation rates, the current year is defined as the year in which the study is conducted, and it becomes the base to which the state participation rate changes are applied.

Using the current year CES rates has two principal advantages. It avoids the task of converting from Census rates to CES rates, and it produces a forecast of total work force which is consistent with the current CES work force estimate.

By making use of the adjusted figure from the Personal Characteristics Handbook, this procedure avoids projecting the discrepancy that may have appeared between the Census labor force and CES work force figures in that Handbook.

Column II Current Year Reference Area Participation Rates

Source: Personal Characteristics Handbook, Worksheet 2, Column V, "Desired Year Reference Area Participation Rates."

Column III Forecast Year Reference Area Participation Rates

Source: Appendix A to the Personal Characteristics Handbook.

Note: If data for the forecast year do not appear in Appendix A, interpolation will be necessary.

WORKSHEET II-2

DERIVING STUDY AREA FORECAST WORK FORCE ESTIMATE DISTRIBUTED BY AGE AND SEX

Sex and Age	Current Year	Reference Area - State			Study Area		
					Forecast Year		
	Study Area CES Partici-pation Rates	Current Year Participation Rates	Forecast Year Participation Rates	Participation Rates Change	CES Partici-pation Rates	Total Population	CES Work Force
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Total Both Sexes							
Male							
Under 14							
14-19							
20-24							
25-34							
35-44							
45-54							
55-64							
65-over							
Female							
Under 14							
14-19							
20-24							
25-34							
35-44							
45-54							
55-64							
65-over							

Column IV Reference Area Participation Rates Change

Instructions: For any particular age-sex cohort, the Forecast Year Reference Area Participation Rates (Column III) should be divided by the Current Year Reference Area Participation Rates (Column II).

Column V Forecast Year Study Area CES Participation Rates

Instructions: This column's data are calculated by multiplying the Reference Area Participation Rates Change (Column IV) by the Current Year Study Area CES Participation Rates (Column I).

Note: Special adjustments for the impact of military employment are generally not required in this projecting methodology. The impact of military employment on local participation rates has already been reflected in the current year data developed earlier, and forecast changes in population will adequately reflect changes in the military in most instances. Only extremely large changes, such as the opening or closing of a large installation, would require special treatment. Appropriate adjustments would then have to be made in the population forecasts used earlier and in the participation rates used in this column.

Column VI Forecast Year Study Area Total Population

Source: Chapter II, Worksheet II-1, Column X, Forecast Year Total Population.

Column VII Forecast Year Study Area CES Work Force

Instructions: Multiply Forecast Year Study Area Total Population (Column VI) by the Forecast Year Study Area CES Participation Rates (Column V).

Note: The resulting CES work force figures will be consistent with the current CES workforce estimate and can be compared with it. Discrepancies between the Census and CES figures which may have appeared between 1960 and the current year have not been projected into this figure.

Section D.

Interim Evaluation of the Work Force Projection

Having developed a projection of the labor supply which is likely to be made available by the study area's population (Worksheet II-2, Column VII), it is possible to make an intial comparison with aggregate demand in order to determine whether overall shortages or surpluses of labor are to be expected.

The desired comparison, of course, requires an estimate of total employment. Thus, while the occupational employment calculations may be limited to non-agricultural wage and salary employment, it is necessary for this purpose to forecast industry employment totals in the other two employment categories, non-agricultural self-employed, unpaid family, and domestic workers; and agricultural workers. Forecasts for these two components of employment should be made by applying, as nearly as possible, the same methodology used to prepare wage and salary forecasts for the various other non-agricultural industries. The resulting forecasts will combine with the wage and salary forecasts to produce a forecast of total employment.

Subtracting this total employment forecast from the work force projection yields, of course, a projected level of unemployment. Such a figure is potentially of great analytical value, for it suggests the general context within which the occupational supply and demand analysis must be conducted, as well as having major policy implications in its own right. More will be said about the analytical use of the figure later in the handbook.

At this point, it is appropriate to make an initial test of the figure's probable validity. If the unemployment estimate resulting from the comparison of the two figures were actually a forecast, it would be expected to yield an unemployment rate that is within the normal range, say between 1.5 and 12 percent, and to be consistent with the general economic assumptions of the study. Larger discrepancies would indicate an error. However, the unemployment figure is not a forecast in the sense that it purports to show the likely level of unemployment in the forecast year. Because the supply data are essentially projections, the unemployment figure developed here principally reveals the implications of certain assumptions and trends. It says, for example, that unless presently developing trends and present plans are changed, there will be a surplus (or shortage) of manpower. Such a statement does not assert that things will remain unchanged, it only serves to reveal the types and directions of changes which will help balance labor supply and demand.[2]

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[2] A very useful symposium on manpower projections, including the issues of forecasts and projections, is contained in the May, 1966, Industrial Relations (Vol. 5, No. 3).

It is not only technically possible but also perfectly consistent with the intent of the study to show very high or, on the other hand, even negative unemployment in the comparison of supply and demand. While extreme imbalances probably will generate corrective changes within the labor market, it is the purpose of the study to point out the appropriate types of changes in order that they can be encouraged. Thus, it is most useful to leave the aggregate supply and demand figures unbalanced and to let those imbalances be reflected in the analysis of the detailed occupations, both through an analytic appreciation of overall trends and through the statistical compilation of occupational supply and demand data.

While reconciliation of the aggregate data is not desirable, it should be remembered that the future unemployment figure is produced by a comparison of two independently derived sets of data, and that error may be produced by judgemental inconsistencies between the two estimates. Therefore, it is desirable at this point to review the supply and demand forecasts to be sure of their mathematical accuracy and to be sure that both reflect the same set of basic assumptions. (It may be helpful to read Chapter VI dealing with the interpretation of aggregate supply and demand data in making this interim evaluation.)

When it has been decided that the estimates are as accurate and consistent as present methodology permits, the output of the several supply sources can be estimated. After the output of the supply sources have been calculated and their contributions to labor supply estimated, another evaluation will be made. At that point, the employment demand will be compared with the two supply estimates, final supply and demand estimates will be established, and data from the two supply sources will be reconciled (see Chapter IV, "Comparison and Reconciliation of Supply Forecasts").

CHAPTER III

FORECASTING THE OUTPUT OF OCCUPATIONAL SUPPLY SOURCES

The second approach to future labor supply, and the one which yields occupational data, is to forecast the output of the various sources from which the labor supply comes. This chapter discusses nine supply sources. They include the currently unemployed, graduates of school vocational training programs, graduates of on-the-job training programs, school drop-outs, graduates of "general education" school curricula, young men returning from military service, women re-entering the labor market after losing their husbands or because their children reach school age, geographic migrants, and people transferring from one occupation to another. As they are defined in this handbook, these nine exhaust the possible supply sources.

It was pointed out in the Introduction that care must be exercised in dealing with these categories lest double counting occur. It was also noted that most of the methodologies included here are entirely new to occupational supply forecasting. Every effort has been made to keep the procedures as simple as possible and to minimize the amount of data which must be collected; this has been done in order to minimize the time required to develop the forecasts.

Section A

Current Unemployment

Persons actively seeking work at the time of the survey, the unemployed, constitute the currently available supply of labor and a source of occupational supply. The total number of such people is estimated monthly by the Research Offices of the Employment Service on the basis of unemployment insurance claims data and the historical relationship of those data to other components of unemployment. Those estimates of total unemployment can be used in the occupational supply study. The problem with using these figures is the identification of the occupational qualifications of the unemployed. Occupational characteristics of current unemployment can be estimated, however.

Step 1.--The Active File

Probably the best single source of information about the occupational characteristics of the unemployed is the Employment Service file of active work applications. It is well known that the active file includes some employed persons and some persons no longer in the labor force, but its size approximates the total number of unemployed rather closely. For example, nationally in May, 1967, there were 2.8 million applications in the active file, and 2.9 million unemployed. Despite its limitations, the active file may very well be the best available indicator of the occupational profile of the unemployed.

The occupational supply represented by these active applications, or a sample of them, must be recorded. The following data may also be recorded to facilitate evaluation and analysis: date of application, length of employment on last job, pay on last job, education, sex, and age. The information should then be tabulated by occupation and used as both a quantitative and qualitative measure of current labor supply in occupations.

Step 2.--Other Sources

Unfortunately, the active file is not a perfect representation of unemployment. Certain occupations tend to be under-represented, since persons in those occupations typically use other hiring channels than the Employment Service. It is not feasible to do a comprehensive survey of all other hiring channels, some of which are highly informal. Therefore, the active file should be used as the principal source of information about the occupational preparation of the unemployed; however, supplementary information should be obtained from other sources, such as unions and professional associations, for particular occupations in which other hiring channels appear to be important additional sources of information.

Step 3.--Judgemental Allocation

When as many unemployed persons as possible have been allocated to various occupations on the basis of data from the active file and other sources, the remainder should be allocated to occupations on a judgemental basis, based on the analyst's knowledge of the local labor market.

Section B

Institutional Vocational Training Graduates

Schools are one major source of future occupational supply. For the purposes of labor supply analysis, only schools in the study area are analyzed here. (The graduates of schools located elsewhere who may enter the study area labor market are classified as geographic migrants for estimating purposes.) School output can be classified as vocational training graduates, graduates of general education programs, and drop-outs. Each of these three output types is treated separately in the chapter. The output of concern here are the graduates of vocational preparatory programs. Vocational training programs are those programs of study which have preparation for specific occupations as goals. The students of concern are those who graduate and thereupon enter the labor market. The sources of vocational training include:

1) Public high schools
2) Private high schools
3) Community colleges
4) Public colleges and universities
5) Private colleges and universities
6) Private business and trade schools
7) Private beauty and barber colleges
8) Private rehabilitation agencies
9) Public social agencies

The methodology presented here is based upon a survey of training institutions. It should be noted that the vocational training sources listed above include agencies as well as training institutions. While agencies usually do not actually operate training programs themselves, they sponsor clients in vocational training programs, both institutional and O.J.T. Consequently they are a good source of information and it is worthwhile to include them in the survey.

Step 1.—Gathering the Basic Data

The basic data to be used in estimating institutional vocational training must be gathered directly from the schools and social agencies. In order to avoid later repetition of the contacts with agencies, procedures are included here for collecting certain information required for the estimation of on-the-job training output. Information about drop-outs and general education graduates from high schools, community colleges, and 4-year colleges may also be gathered during this survey for later use (see Sections D and E of this chapter).

There are a number of ways of identifying the institutions and agencies in the study area which may be doing vocational education. For the public high schools, the county-wide boards of education are probably the best source. The data for all public high schools can usually be obtained from that source, avoiding the necessity of contacting each public high school individually. For the private high schools, central data sources such as the Catholic Board of Education should be explored whenever possible.

The community colleges and the public and private colleges and universities will probably have to be surveyed individually. The telephone directory, the Veterans Administration office, or the county board of education are likely sources of lists of schools in the area.

There are also a number of sources available for identifying the private business and trade schools, and the private beauty and barber colleges. A partial list of these schools is available from the E.S.-202. In addition to the telephone directory, the state agency regulating private schools will have a list and some data on these private institutions. (The private business and trade schools and the private beauty and barber colleges may exhibit enough homogeneity that sampling would prove useful. Such a possibility should be considered, especially in large S.M.S.A.'s.)

For a list of the public and private agencies there are three primary sources available. A directory of state agencies is one. The C.A.M.P.S. office should also be able to help. In addition, many communities have social service directories. It is also a good idea to ask the representative of the various public agencies about the existence of private rehabilitation agencies, since the two types of agencies many times work quite closely.

The institutional and agency training data are to be obtained from the various schools and agencies by interviews with their program directors. These representatives should be contacted individually, and a questionnaire should be completed during each of these interviews.

Instructions for

WORKSHEET III-1: TRAINING OUTPUT QUESTIONNAIRE

Column I Program Title

Instructions: List each of the various training programs by occupational designation.

Note: Obtain specific occupational designations based on course content, not curriculum designation. This is always a problem with school interviews. Also note that programs, not individual courses, are the appropriate units.

Column II Length of Program

Note: The length of the occupational programs is one variable which indicates the level of qualification of program graduates and helps in applying the appropriate occupational codes to the programs.

Column III Number Enrolled

Instructions: Enter the current enrollment for each program.

Note: This figure should indicate the number of persons enrolled in the occupational preparatory program, not the sum of the enrollments in various individual courses. This is important because most occupational preparatory students enroll in more than one course, and also because students in general education programs (especially in high schools) often take individual occupational preparatory courses.

Column IV Number Who Will Complete Training During the Forecast Period

Instructions: Obtain an estimate for each occupation of the number who will complete training during the forecast period.

Note: The appropriate figure for this column is the estimated output during the forecast period, not an enrollment figure for the target year.

Column V(a) Percent Who Will Seek Work in the Study Area

Instructions: Obviously not all the persons who complete a training program in a particular study area will either enter the labor market or seek work in the study area. It is therefore necessary to obtain an estimate of the percent of persons, out of total future

WORKSHEET III-1

SAMPLE TRAINING OUTPUT QUESTIONNAIRE

State of Oregon
Department of Employment

Training Output Questionnaire

This questionnaire is intended to collect information about training activities in this area. The information will be balanced against the current and prospective demand for workers, and thereby help to identify worker shortages. We would appreciate any comments you may have about this area's labor market and work force. Please use the back of this questionnaire for your comments. Thank you.

Name of Institution or Agency______________________________

Person Completing Form______________________________

Present Total Enrollment_______________

Please complete all columns for the vocational training programs which you offer. Also, please list programs to be added during the forecast period.

						Graduates are:		For Use By Social Agencies Only		
								Type of Training		
Program Title	Length of Program (in months)	Number Enrolled	Number Who Will Complete Training During Forecast Period	Percent Who Will Seek Work in the Study Area	For Office Use Only	Fully Qualified	Ready for Trainee Positions	OJT	Institutional	Training Institution
(I)	(II)	(III)	(IV)	(Va)	(Vb)	(VI)	(VII)	(VIII)	(IX)	(X)

output, who will seek work in the study area.

Note: It should also be pointed out that it is the percent who will seek work in the study area, not the percent who will obtain work, that is relevant.

The percentage estimate is used rather than the number, since this seems to be the more easily obtainable figure from representatives of the various institutions and agencies.

Column V(b) (For Office Use Only)

Note: This column will be used to calculate the number who will seek work in the study area.

Columns VI and VII Graduates Who Are Fully Qualified or Ready for Trainee Positions

Instructions: Obtain percentage estimates of the graduates who will be fully qualified and those who will only be ready for further training positions, out of the total completion figures for each occupation.

Note: These percentage estimates will later be applied to the number that will seek employment in the Study Area (Column Vb) to help indicate the level of preparation of graduates.

Columns VIII, IX, X (For Use by Social Agencies Only)

Columns VIII and IX O.J.T. and Institutional Training

Instructions: On agency questionnaires, designate whether trainees are participating in O.J.T. or institutional training.

Column X Training Institutions

Instructions: On agency questionnaires, designate the school at which institutional training is being done, so that trainees reported by both the agency and the school will not be counted twice.

Step 2.--Editing and Coding Questionnaires

After the questionnaires have been completed, the analyst should edit them to make sure that all the columns are completed for each occupation.

It will also be necessary for the analyst to apply the percentage estimates of graduates entering the local labor market (Column Va) to Total Completions (Column IV) to obtain the Number of Persons in each Program Who Will Seek Employment in the Study Area (Column Vb).

Also the percentages of Graduates who are Fully Qualified (Column VI) and those who are Ready for Trainee Positions (Column VII) should be applied to the Number Who Will Seek Work in the Study Area (Column Vb) to obtain absolute figures.

Each occupation listed in Column I should then be given an occupational code. Care must be taken in coding occupational titles, since in many cases these titles reflect curriculum, not occupational content. In some cases, reporting institutions list exaggerated occupational titles, e.g. accounting, when in fact the school is training bookkeepers. The Length of Program (Column II) is one indicator of the levels of these courses, as is the degree of qualification (Columns VI and VII). Occasionally agency occupational descriptions are superior to those of the training institution; in these cases the agencies' occupational designations can be used to suggest a code for the program. It may sometimes also be appropriate to break a single school program into several components to indicate the several occupations for which it prepares people.

In the coding process, the program entries should be edited. If there are programs such as remedial education or work experience that are essentially nonoccupational, they should be deleted.

Step 3.--Tabulation of the Basic Institutional Vocational Training Data

The school and agency institutional training data should then be tabulated by specific occupation to facilitate supply and demand comparisons. This can be accomplished in the following manner.

Instructions for
WORKSHEET III-2: INSTITUTIONAL VOCATIONAL TRAINING

Column I Occupational Code

Instructions: The appropriate occupational code from the questionnaires should be entered for each occupation in which institutional training is being done by a training institution or sponsored by a social agency. Note: Agency sponsored O.J.T. is to be tabulated separately. (See Section C of this Chapter.)

Column II Occupational Titles

Instructions: The occupational title for the programs listed on the questionnaires should be entered, in occupational code order, including all those reported by either institutions or agencies.

Column III Reporting Institutions

Instructions: The individual schools or agencies which reported trainees should each be listed under each specific occupational title.

Column IV Training Period

Instructions: The training periods for each occupational training program of each reporting institution should be entered in this column.

Column V Current Enrollment

Column VI Completions During the Forecast Period

Column VII Number of Training Graduates Who Will Seek Work in the Study Area

Column VIII Fully Qualified Training Graduates

Column IX Trainee Qualified Training Graduates

Instructions: Enter the figures for enrollment, completions, output, and fully or trainee qualified graduates as calculated or reported on each questionnaire for each occupation.

Column X Training Institutions

Instructions: Enter the names of the training institutions for agency sponsored trainees.

Note: The term "training institutions" refers only to those institutions (mostly schools) for whom a questionnaire is included in the survey and who also have persons enrolled from reporting agencies.

This column is necessary so that adjustments for double counting can be made when deriving specific occupational totals.

Vocational Training Totals

Columns V, VI, VIII, and IX

Instructions: Vocational training totals for specific occupations for Current Enrollment (Column V), Completions During Forecast Period (Column VI), and the Number of Training Graduates Who Will Seek Work in the Study Area (Column VII) as well as the number Fully Qualified (Column VIII) and Trainee Qualified (Column IX) can, in most cases, be obtained

WORKSHEET III-2

INSTITUTIONAL VOCATIONAL TRAINING TABULATION

Occupational Code	Occupational Titles	Reporting Institutions	Training Period	Current Enrollment	Completions During Forecast Period	Number Who Will Seek Work in the Study Area	Fully Qualified Training Graduates	Trainee Qualified Training Graduates	Training Institutions (for Agency-sponsored trainees)
(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)

by summing the individual figures for the various reporting institutions. This procedure is possible in those occupations in which the problem of double counting does not arise, i.e. there are no sponsoring agencies.

In those occupations in which there are both training institutions and sponsoring agencies reporting, it is necessary to adjust to avoid double counting. Those persons reported both places should be counted only once, usually in the training institutions' figures. For example, suppose M.D.T.A. were training 10 clerk-stenographers, 7 at the community college and 3 O.J.T. Further suppose the community college reported training a total of 20 clerk-stenographers. All 20 would be counted in the community college figure; the 7 institutional trainees sponsored by M.D.T.A. would be listed on the tabulation but not added to the total (since they were already counted in the community college figure of 20). The 3 O.J.T. would be counted in the on-the-job training tabulation.

Agency sponsored training which is not also reported by the training institution, e.g. correspondence classes, schools out of the area, etc., should be included in the total.

The completed tabulation, listing the forecast supply from institutional vocational training programs, is ready for analysis. At this point the data may be summarized into broad categories to indicate the size and types of vocational training in the area. Ultimately, however, this tabulation will be combined with information about the other supply sources in an occupation by occupation analysis of supply and demand.

Section C

On-the-Job Vocational Training Graduates

The methodology presented below for obtaining on-the-job training data can be used to estimate current enrollment as well as the more essential figure forecast trainee output. The procedures are based on three basic considerations. First, the desirability of distinguishing between institutional and on-the-job trainees. Second, the substantial under-reporting of on-the-job trainees on the part of employers, indicated by the fact that the number of on-the-job trainees reported by social agencies frequently exceeds the number reported by employers in specific occupations. Finally, the potential for double counting those on-the-job trainees reported by both agencies and employers.

Employer O.J.T. Data

Employer on-the-job training data may be collected during the employer demand survey. The necessary information can be incorporated in the demand questionnaire by including appropriate questions on the questionnaire, assigning an occupational code which will indicate trainee positions, and providing space on the basic data cards. This procedure makes it convenient to report other required information about trainee positions.

Under this method, two items must be incorporated in the employer survey questionnaire. First, with reference to the listing of occupations, trainee positions must be listed separately. If the employer lists the occupations, he must be instructed to list trainee positions separately. The second essential item has to do with the number of trainees expected to complete training during the forecast period. This must not be confused with the number of trainees expected to be employed at the survey date; therefore it should be given a separate column.

If substantial additional information is needed regarding employer training programs or if demand data are not based on an employer survey, a separate questionnaire may be used. Care should be taken in designing such a questionnaire to insure that it meets the requirements discussed here.

Processing of Data

If the trainee data are to be coded and machine processed, two additional things are required. First, trainee positions must be assigned occupational codes which distinguish them from other occupations. (The 6-digit D.O.T. code is not sufficient for this purpose, so a separate system of coding was developed for the Lane County Labor Skill Survey.) Secondly, in addition to recording present and future employment information, the basic data card must provide space for the forecast of training output. With these modifications, the employers' trainee data can be expanded and tabulated in the same manner as the rest of the employer data.

If a hand processing method is utilized, on-the-job training data may be processed by the following methodology:

Step 1.--Basic Employer Data

The data for employers' on-the-job trainees should be obtained by specific occupational designation from the employer questionnaires. Individual firm information should be recorded on "Basic Data Cards," such as the one presented below which was used in the Eugene study. The specific content of the card will, of course, reflect the content of the questionnaire.

Replica of Basic Data Card

Firm Name			Sample Group
Occupational Code		Job Title	
	Past Year (1962) Employment		Current Year (1967) Employment
Entry Wage	Maximum Wage	Forecast Output	Comments

Step 2.--Expansion of Employer On-the-Job Training Data

Since employers are sampled according to a stratified random sample, employer-reported on-the-job trainee data must be expanded to represent the universe of non-farm wage and salary jobs. The following procedure should be used.

The cards should be sorted into sample group order and the expansion factors for each sample group applied as follows:

Past Year Expansion Factor X "Past Year Employment"
Current Year Expansion Factor X "Current Employment"
Forecast Expansion Factor X "Forecast Output"

The results should then be recorded above the unexpanded items on the Basic Data Card.

Step 3.--Tabulating the Data

The Basic Data Cards should then be put in numerical order by occupational code and summarized in the following manner.

WORKSHEET III-3

TRAINEE OCCUPATIONS AS REPORTED BY EMPLOYERS

Code	Title	Current Employment	Forecast Trainee Output
(I)	(II)	(III)	(IV)

Instructions for
WORKSHEET III-3: TRAINEE OCCUPATIONS AS REPORTED BY EMPLOYERS

Column I Occupational Code

Instructions: The code for each employer-reported occupation should be entered in this column.

Column II Occupational Title

Instructions: The title of each occupation should be entered here.

Column III Current Employment

Instructions: The expanded current year employment from the Basic Data Cards for each occupation should be totaled and entered in this column.

Column IV Forecast Trainee Output

Instructions: The expanded forecast trainee output contained on the Basic Data Cards for each occupation should be totaled and entered in this column.

Note: The analyst should be aware that the significant figure is forecast output (a flow), not forecast O.J.T. enrollment (a stock).

Social Agency O.J.T. Data

A substantial portion of the on-the-job training being done by employers is being sponsored by social agencies. Consequently, the apprenticeship agencies and other social agencies are a second source of information about on-the-job training.

It will be remembered that agency sponsorship of O.J.T. was reported at the time the agencies were surveyed; the O.J.T. entries on those questionnaires can serve as the source of information for the following worksheet, III-4.

Obtaining the Final On-the-Job Training Output Forecasts

The methods for obtaining the final estimates for forecast on-the-job training output and the final estimates for current enrollment involve comparison of the two sets of O.J.T. information and the development of a final estimate.

Procedurally, the two processes are much the same, so it is necessary to present only one example. The essential figure is the forecast output, so the following worksheet will be presented in terms of that figure. Only slight modifications are required to calculate final estimates for current enrollment and other data.

Instructions for
WORKSHEET III-4: ESTIMATING ON-THE-JOB TRAINING OUTPUT

Columns I and II Occupational Code and Title

Instructions: List each of the specific occupations reported by either employers or agencies.

Column III Forecast Employer On-the-Job Training Output

Source: Worksheet III-3, "Trainee Occupations as Reported by Employers," Forecast Trainee Output (Column IV).

Columns IV-VI Forecast Agency Sponsored On-the-Job Training Output

Source: The various social agency questionnaires from the Institutional Vocational Training Survey.

Note: There would be as many columns here as there are social agencies sponsoring on-the-job training.

Column VII Total, All Agencies

Instructions: Obtain this column's data for any particular occupation by summing the figures for that occupation from the Forecast Agency Sponsored On-the-Job Training Output (Columns IV-VI).

Column VII Final Forecast On-the-Job Training Output Estimate

Instructions: The final on-the-job training estimates can now be made for each occupation based on the two sets of data from employers and agencies. Usually, the employer-reported figures should be used as the final forecasts in those occupations reported only by employers. In those occupations in which both employers and agencies reported trainees, it is generally best to use the higher figure. There may be a few instances in which there is strong reason to believe that the employers and agencies reported different trainees, however; in these cases, the analyst may choose to combine part or all of both figures in his final estimate.

As it was previously pointed out, the procedure for obtaining the on-the-job training enrollment estimates involves precisely the same

WORKSHEET III-4

ESTIMATING ON-THE-JOB TRAINING OUTPUT

Occupation		Forecast Employer On-the-job Training Output	Forecast Agency Sponsored On-the-Job Training Output				Final Forecast On-the-Job Training Output Estimates
Code	Title		Agency 1	Agency 2	Agency 3	Total, All Agencies	
(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)

operation as the methodology outlined above for the forecast output. Only column headings will change to reflect the differences in the data.

Section D

School Drop-outs

A significant number of young people enter the labor force without having completed high school. Others begin but do not complete more advanced education. These "drop-outs" constitute another source of supply.

For the purposes of this analysis, drop-outs are defined as including all students who leave school in the study area without completing their courses of study, for whatever reason. Those who merely transfer from one school to another are not classed as drop-outs. If the drop-out rates received from the institutions include school transfers, an adjustment must be made, since a net in-transfer of students would tend to compensate for some drop-outs and understate the rate, while a net out-transfer would inflate the estimated drop-out rate.

Estimates will be made of the number of drop-outs from high schools, community colleges and public and private 4-year colleges. While drop-outs do occur from private schools, apprenticeship and other vocational education programs, and while the the rates may be relatively high, the high schools, community colleges and universities cover the vast majority of students and, therefore, of potential drop-outs. Moreover, an attempt to estimate the drop-outs from the other sources would be severely hampered by an almost total lack of relevant data.

The procedure for estimating the number of drop-outs requires reports of current enrollment and enrollment projections for each year of the forecast period. It also requires estimates of drop-out rates, preferably by school class, along with other data developed earlier in this chapter in estimating other supply components. The number of drop-outs is estimated by applying the drop-out rates to the school enrollment data.

Once the total number of drop-outs has been calculated, the percent of drop-outs who will thereupon seek employment in the study area must be estimated, using data obtained from the various institutions. The application of those estimated percentages to the forecast total number of drop-outs yields the number of drop-outs who will seek work in the study area during the forecast period.

The following worksheet can be used to estimate drop-outs from the schools who will seek work in the study area. It should be noted that it will be necessary to apply the worksheet to each school, or group of schools, for which separate drop-out rates are estimated.

WORKSHEET III-5

SCHOOL DROP-OUTS WHO WILL SEEK WORK IN THE STUDY AREA

Year and Class (I)	Total School Enrollment (II)	School Drop-out Rates (III)	Total School Drop-outs (IV)	Local Accession Rates (V)	School Drop-outs Who Will Seek Work in the Study Area (VI)

Instructions for

WORKSHEET III-5: SCHOOL DROP-OUTS WHO WILL SEEK WORK IN THE STUDY AREA

Column I Year and Class

Instructions: Make entries by academic class for each year of the forecast period. For high schools, include the four grades 9-12 (the grades most closely paralleling years of work force age, 14 and over).

Note: Separate worksheets will be required for each school or type of school for which data are collected.

Column II Total School Enrollment

Instructions: Enter the estimated or forecast enrollment for the years and classes indicated by Column I.

Sources: Current enrollment data for the public high schools can usually be obtained from the county boards of education. Enrollment projections for five year periods are available from many districts. Other sources of projections are the state Department of Education and local planning agencies. Rough projections can also be made using the population projections developed in this handbook for the appropriate age groups.

For state colleges and universities, enrollment figures, including projections, can usually be obtained. In Oregon, they are available from the Office of Institutional Research for the State System of Higher Education in Eugene.

Data for private high schools and community colleges are probably available only from the schools themselves.

Note: Much of this information can be collected at the time schools are interviewed for the vocational training output survey (see Section B).

Column III School Drop-out Rates

Instructions: Enter the annual drop-out rates (drop-outs per year as a percent of enrollment), by school class if available. Unless there is reason to believe there is a consistent trend in the drop-out rates, it will be most appropriate to use the current rates for the future years as well.

Sources: Drop-out rates are not readily available. If local data are not available, statewide rates (published in Oregon by the state Department of Education) can be used.

For the public four-year colleges, community colleges and private high schools, rates generally must be obtained from the schools themselves.

If rates for a particular school are not available from any source, it may be possible to substitute rates from a similar institution, taking care to see that administrative policies in the two schools regarding termination of students are similar.

Note: The term "drop-out" seems to be used with very different meanings by different educators. Therefore it is necessary to be sure that the data correspond with the definition used in this analysis, i.e. include all terminations regardless of reason, but exclude transfers to other schools.

Column IV Total School Drop-outs

Instructions: Multiply enrollment (Column II) by the drop-out rates (Column III) and enter the result in Column IV. Sum this column to obtain the number of drop-outs during the forecast period.

Column V Local Work Force Accession Rate

Instructions: Opposite the total of Column IV, enter the estimated work force participation rate for recent drop-outs of this school (or type of school).

Note: The relevant rates are the percent of drop-outs who enter the labor market and seek work in the study area.

Sources: Follow-up studies of graduates and drop-outs from individual schools, which could yield work force accession rates, are not generally available. Consequently it is necessary to estimate the rates from available participation rate data. Several sources were found for the Eugene study, and their data are presented below.

TABLE 1

Group	Work Force Participation Rates Total	Males	Females
U.S. High School Drop-outs, 16-19	61%	84%	40%
(Source: Manpower Report of the President)			
Lane County High School Seniors			
6 months after graduation	34	37	32
1 year after graduation		37	31
2 years after graduation		35	36
(Source: Lane County Youth Project High School Follow-up)			
U.S. High School Graduates, 16-24, not in college (converted to a rate for all high school graduates 16-24 using national rates for college attendance)	38	36	40
(Source: Manpower Report of the President)			

Estimates of participation rates for the graduates of the various vocational education programs in the study area can be derived from the institutional training supply questionnaires. Such rates, while undoubtedly higher than the rates for either drop-outs or general education graduates, should be of some use in estimating the desired rates. Such data will be particularly helpful in appraising the degree to which students from a state university remain in the study area to seek work.

The accession rates from the high schools, community college, and the University of Oregon used in the Eugene study are presented below.

TABLE 2

Schools	Local Work Force Accession Rates
Public High Schools	
Drop-outs	30%
General Education Graduates	35
Lane Community College	
Vocational Education Drop-outs	55
General Education Drop-outs	40
Vocational Education Graduates	65
General Education Graduates	30
University of Oregon	
Vocational Education Drop-outs	13
General Education Graduates	13

Column VI School Drop-outs Who Will Seek Work in the Study Area

Instructions: Multiply the total number of school drop-outs (Column IV) by the local work force accession rate (Column V).

The total estimate of drop-outs who will be available as part of the forecast labor supply will be made by summing the estimates (Column VI) from the individual worksheets prepared for each of the various schools or groups of schools.

Procedures for allocating this and other aggregate supply forecasts are presented in Chapter V.

Section E

Graduates of General Education Programs

The large number of school graduates who will seek work with no specific occupational preparation represent another source of future occupational supply. Of all the training institutions, only the public and private high schools, community colleges, and the public and private four year colleges have general education curricula; consequently these are the only sources of general school graduates. The persons to be counted here as supply are those who graduate from a general education program in the study area and thereupon enter the labor market.

The methodology presented here treats these general school graduates as a residual after school drop-outs and vocational education students have been subtracted from the graduating class enrollment figures. The methodology consists of essentially four steps. First, the graduating class enrollment figures for each year in the forecast period are recorded. Secondly, school drop-outs are subtracted. Thirdly, the vocational education graduates are deducted from the total number of graduating students. Finally, the rates of entry into the labor market are applied to the resulting total number of general education graduates to obtain the number who will seek employment in the study area. The appropriate labor market entry rates are those which identify graduates who enter the labor market after graduation without pursuing further education or otherwise deferring their entry into the labor market.

The following worksheet makes use of the data on vocational graduates and drop-outs developed in the preceding two sections to estimate the number of graduates from general education programs who will seek work in the study area.

Instructions for

WORKSHEET III-6: GENERAL EDUCATION GRADUATES WHO WILL SEEK WORK IN THE STUDY AREA

Column I Total Graduating Class Enrollment

Source: The data for this column can be obtained from Total School Enrollment (Column II) of Worksheet III-5, "School Drop-outs Who Will Seek Work in the Study Area." Only the enrollment figures for the graduating class are required.

If for some reason the school drop-out methodology is not used, the graduating class enrollment will have to be obtained in the manner described in Section D of this chapter of the handbook.

Note: A separate worksheet must be prepared for each school or type of school for which estimates are being made.

Column II Graduating Class Drop-outs

Source: Total School Drop-outs, Column IV of Worksheet III-5. Again, it is only the drop-outs of the graduating class that are relevant for this worksheet.

Column III Total Number of Graduating Students

Instructions: This column's data for any particular graduating class are obtained by subtracting the Graduating Class Drop-outs (Column II) from the Total Graduating Class Enrollment (Column I).

Column IV Graduating Vocational Education Students

Source: The Institutional Training Supply Survey questionnaires for the high schools, community colleges, and the public and private colleges and universities.

Column V Total Number of General School Graduates

Instructions: This column's data are obtained by subtracting the Graduating Vocational Education Students (Column IV) from the Total Number of Graduating Students (Column III).

Column VI Local Work Force Accession Rates

Source: The analyst should refer to the discussion of these data presented in Section D. See the instructions for Column V of Worksheet III-5 in that section.

Column VII General School Graduates Who Will Seek Work in the Study Area

Instructions: This column's data are obtained by multiplying the Work Force Participation Rates (Column VI) by the Total Number of General School Graduates (Column V).

WORKSHEET III-6: GENERAL EDUCATION GRADUATES WHO WILL SEEK WORK IN THE STUDY AREA

Year and Graduating Class	Total Graduating Class Enrollment (I)	Graduating Class Drop-outs (II)	Total Number of Graduating Students (III)	Graduating Vocational Education Students (IV)	Total Number of General Education Graduates (V)	Local Work Force Accession Rates (VI)	General School Graduates Who Will Seek Work in Study Area (VII)
1967-68							
1968-69							
1969-70							

Section F

Military Returnees

Men returning from the armed forces and entering the labor market represent a sufficient number of potential additions to the labor supply to warrant an attempt to quantify this supply source.

The methodology presented yields a rough estimate of the military returnees, a source of forecast supply which had previously been considered unquantifiable. If forecasts of the number of young men expected to return during the forecast period are available from the draft board or other sources, those figures should be used and the estimating process can move directly to Step 3 below. If forecasts are not available, the following procedure can be used.

First, obtain a report of returnees during a recent period from the local draft board. Second, expand this sample period figure to represent the total number of military returnees who will return during the forecast period. Finally, estimate the number of military returnees who will seek work in the study area during the forecast period. In this connection, a deduction from the total returnee figure must be made for those returnees who will enter some type of training program rather than seeking work upon returning from the military.

Instructions:

Step 1. Sample Period Data

It will first be necessary to obtain data on the number of men returning from the armed forces during a sample period.

Source: If forecasts of the number of military returnees are not available, the analyst should obtain from the local draft board an historical sample of the number of discharges during a past six-month period. The local draft board publishes a six-month classification report of men from that board, which is a matter of public record. By obtaining a definition of the Selective Service classification symbols, the analyst can count the number of men who were discharged, both from enlistments and drafts, during a given six-month period. For future use in allocating returnees to occupations, it is also necessary during this contact to collect information on the ages of returnees (see Chapter V, Section C).

Step 2. Expand the Sample

It will then be necessary to expand the sample period total number of returnees to represent the entire forecast period.

Instructions: To expand the sample group of returnees, multiply the sample period total by the number of six-month periods in the forecast period. A rate of increases or decreases may be applied based on an evaluation of military requirements if it seems appropriate, since a simple multiple could lead to the under or over estimating of the returnees if, for example, the magnitude of the Vietnam war were expected to change. Some indication of the likely trend may be obtained at the local draft boards.

Men do not always return to the area in which they enlisted or were drafted, so the draft board data cited above do not report the men who will return to the study area. In most cases, however, it is not unreasonable to assume that the net effect of this factor will be negligible, i.e. to assume that military returnees from other areas will enter the study area in similar numbers to those from the study area who will not return after military service. This assumption does not appear unduly restrictive. If there is strong reason to think that there is an imbalance between those from the study area who do not return and those from outside who enter the study area upon discharge, adjustments in the total number of "returnees" can be made.

Step 3. Deduction for Training

Finally, it will be necessary to deduct from the total those service returnees who will embark on educational programs rather than entering the labor market immediately upon returning from military service. This adjustment will yield the number of returnees who will seek work in the study area's labor market. (Nearly all military returnees either enter school or seek work).

Source: The best source of information on the number of returnees who will go to school is the local Office of Veteran's Affairs. The Lane County Office estimated that about 50 percent of the returning servicemen pursue some form of educational program.

Section G

Labor Force Re-entrants

Another source of occupational supply is made up of people who re-join the labor force after a substantial period of absence. They principally are women who re-enter the labor market when their children reach school age or because they lose their husbands.

The number of women likely to re-enter the labor market during the forecast period is estimated by applying the national accession rates related to the children reaching school age and the loss of husband (see Table 3 below) to the appropriate local estimates of the female population in various age groups.

Table 3

National Re-entry Rates for Women[1]

Age	1960 U.S. Female Population 14 Yrs & Over (I)	U.S. Female Accessions Per Year[1] (II)	Annual U.S. Female Accession Rates (III)
Total	64,961	380	—
Under 14	—	—	—
14-19	7,934	0	0
19-24	5,520	4	.0007
25-34	11,648	93	.0080
35-44	12,337	170	.0138
45-54	10,486	89	.0085
55-64	8,138	24	.0029
65-over	8,898	0	0

[1] Includes only accessions related to children reaching school age and loss of husband.

WORKSHEET III-7: ESTIMATING FEMALE RE-ENTRANTS DUE TO ACCESSIONS RELATED TO CHILDREN REACHING SCHOOL AGE AND LOSS OF HUSBAND

Age	Annual U.S. Female Re-entry Rates (I)	Forecast Period Female Re-entry Rates (II)	Current Year Study Area Female Population (III)	Forecast Period Study Area Female Re-entrants (IV)
Total	____			
Under 14	____			
14-19	0			
20-24	.0007			
25-34	.0080			
35-44	.0138			
45-54	.0085			
55-64	.0029			
65-over	0			

Instructions for Worksheet III-7

Column I Annual U.S. Female Re-entry Rates

Source: Column III of Table 3 presented above.

Column II Forecast Period Female Re-entry Rates

Instructions: The data for any particular age cohort are obtained by multiplying the Annual Female Accession Rates (Column I) by the number of years in the forecast period.

Column III Current Year Study Area Female Population

Source: The Desired Year Total Population (Column X) of Worksheet I in the *Personal Characteristics Handbook*.

Column IV Forecast Period Study Area Female Re-entrants

Instructions: This column's data are obtained for any particular age cohort by multiplying the Forecast Period Female Re-entry Rates (Column II) by the Current Year Study Area Female Population (Column III).

Note: This procedure for calculating female re-entrants slightly underestimates the actual number, since some women re-enter for reasons other than "children reaching school age," or "loss of husband." In the working life tables from which the rates are calculated, women who left the labor force after marriage and returned at a later time for other than the above mentioned reasons are classified with "accessions related to age," and therefore are indistinguishable from new entrants. The resulting under-estimate is probably not substantial, however.

Procedures for allocating this estimate of the total number of female re-entrants to specific occupations is discussed in Chapter V, Section D.

Section H

Net Geographic Migrants

A sizeable source of occupational supply may be created by persons moving into a study area from other geographical areas. This component includes all workers who move into the area, regardless of the level or source of their occupational preparation. (Consequently, graduates of schools in other areas are classified as migrants for estimating purposes.)

If it were possible, it would be desirable to develop separate data on the gross in-migration and gross out-migration which is expected to occur over the forecast period. However, no methodology exists which would allow such an analysis. Consequently, migration methodologies measure only the net effect of in- and out-migration. Net in-migration constitutes a labor supply source, and it must be estimated. (Note that net out-migration constitutes a labor demand item and should be analyzed as such. The estimating methodology is the same as for net in-migration, however.)

The following methodology utilizes data developed in the Handbook on the Personal Characteristics of the Work Force and its re-application to the forecast period, and enables the analyst to obtain a figure for net geographic migration. The methodology consists of four steps. First, the distribution of the current year population by age and sex. Second, the distributed current year population should be aged and survived through the forecast period. Third, the aged and survived current year population for each age-sex cohort is to be subtracted from the estimated forecast population distributed by age and sex, the difference being the change in population due to migration. Finally, the calculated forecast year CES work force participation rates are to be applied to the estimated migration of population to obtain the estimated total number of work force net geographic migrants.

Instructions for

WORKSHEET III-8: NET GEOGRAPHIC MIGRATION FOR THE WORK FORCE BY AGE AND SEX

Column I Current Year Population 14 yrs. and over

Source: This column's data can be obtained from the Desired Year

WORKSHEET III-8: NET GEOGRAPHIC MIGRATION FOR THE WORK FORCE BY AGE AND SEX

Sex and Age	Current Year Population	Forecast Period Survival Rates	Survived Current Year Population			Forecast Year Population 14-over	Total Net Migration 14-over	Forecast Year C.E.S. Work Force Participation Rates	Forecast Period Net Work Force Migration
			Population	New Age Groups (if necessary)	Population in Standard Age Groups (if necessary)				
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Total, Both Sexes									
Male									
Under 14									
14-19									
20-24									
25-34									
35-44									
45-54									
55-64									
65-over									
Female									
Under 14									
14-19									
20-24									
25-34									
35-44									
45-54									
55-64									
65-over									

Total Population (Column X), Worksheet I, of the Personal Characteristics Handbook.

Column II Forecast Period Survival Rates

Source: Table 4, which is reproduced from Current Population Reports, P-25, No. 286, July 1964, "Projections of the Population of the United States by Age and Sex: 1964 to 1985," Table A-3.

Note: If the forecast period is something other than 5 years it will be necessary to interpolate or extrapolate the 5-year rates contained in Current Population Reports.

Column III Survived Current Year Population

Instructions: This column's data are obtained by multiplying the Current Year Population (Column I) by the Forecast Period Survival Rates (Column II) for each age-sex cohort.

Column IV New Age Groups (if necessary)

Instructions: If the forecast period is five years or a multiple of five years, the Survived Current Year Population (Column III) can be entered opposite the cohorts' new age groups, i.e. 14-19 year olds, aged and survived five years, will be 20-24 and data can be entered on the 20-24 line of Column III. Columns IV and V can then be ignored.

If the forecast period is not five years or a multiple of five years, new age groups will result. These new groups should be entered in Column IV.

Column V Population in Standard Age Groups (if necessary)

Note: If the forecast period is something other than 5 years, adjustments will be necessary to make the new age group data consistent with the standard age groups used in the stub. Consistency is necessary so that the necessary subtraction for Total Net Migration 14 years-over (Column VII) can be accomplished. A rectangular distribution can be utilized for this purpose.

Column VI Forecast Year Population, 14 yrs. and over

Source: This column's data can be obtained from Column X of Worksheet II-1, as applied in Chapter II of this Handbook to the independent population estimate.

TABLE 4

Table A-3.—FIVE YEAR SURVIVAL RATES, 1960, AND RATES PROJECTED ACCORDING TO ASSUMPTION OF SLIGHTLY DECLINING MORTALITY, 1965-1970 to 2005-2010

(Projected rates based on projections of population in 5-year age groups assuming no net immigration. The small fluctuations and decreases in rates arise from variations from one period to another in the relative weighting, within each 5-year age group, of the underlying single-year-of-age survival rates, all of which were assumed to show gradual increases or to be constant between 1960 and 2000 and to remain constant thereafter. For further explanation of the derivation of these rates, see text)

Initial age	Terminal age	1960[1]	1965 to 1970	1970 to 1975	1975 to 1980	1980 to 1985	1985 to 1990	1990 to 1995	1995 to 2000	2000 to 2005	2005 to 2010
						BOTH SEXES					
Births	Under 5	.97254	.97453	.97582	.97705	.97829	.97955	.98084	.98211	.98257	.98256
Under 5	5 to 9	.99585	.99595	.99597	.99604	.99613	.99623	.99630	.99637	.99642	.99642
5 to 9	10 to 14	.99784	.99788	.99790	.99792	.99794	.99796	.99798	.99801	.99802	.99802
10 to 14	15 to 19	.99669	.99673	.99672	.99671	.99675	.99677	.99678	.99678	.99678	.99679
15 to 19	20 to 24	.99456	.99454	.99455	.99455	.99455	.99458	.99460	.99461	.99461	.99461
20 to 24	25 to 29	.99366	.99365	.99367	.99371	.99374	.99376	.99380	.99383	.99384	.99384
25 to 29	30 to 34	.99232	.99298	.99307	.99317	.99326	.99336	.99345	.99356	.99360	.99360
30 to 34	35 to 39	.99033	.99050	.99085	.99106	.99126	.99145	.99163	.99181	.99192	.99193
35 to 39	40 to 44	.98527	.98567	.98596	.98633	.98664	.98694	.98722	.98748	.98755	.98761
40 to 44	45 to 49	.97653	.97734	.97774	.97821	.97881	.97932	.97980	.98025	.98036	.98028
45 to 49	50 to 54	.96283	.96395	.96471	.96533	.96608	.96701	.96778	.96852	.96873	.96863
50 to 54	55 to 59	.94396	.94554	.94679	.94785	.94869	.94969	.95092	.95194	.95230	.95221
55 to 59	60 to 64	.91628	.91918	.92087	.92262	.92407	.92521	.92659	.92836	.92883	.92873
60 to 64	65 to 69	.87738	.88094	.88320	.88530	.88747	.88925	.89062	.89231	.89332	.89318
65 to 69	70 to 74	.82320	.82916	.83195	.83503	.83788	.84095	.84329	.84524	.84603	.84656
70 to 74	75 to 79	.74407	.75150	.75593	.75947	.76329	.76678	.76947	.77345	.77378	.77363
75 to 79	80 to 84	.62763	.63619	.64001	.64470	.64854	.65260	.65617	.66018	.66071	.65949
80 and over	85 and over	.40535	.41627	.41957	.42150	.42415	.42862	.43246	.43590	.43663	.43570
						MALE					
Births	Under 5	.96914	.97139	.97285	.97426	.97566	.97710	.97856	.98001	.98054	.98053
Under 5	5 to 9	.99538	.99550	.99553	.99560	.99571	.99582	.99590	.99598	.99603	.99604
5 to 9	10 to 14	.99741	.99746	.99748	.99751	.99754	.99757	.99760	.99762	.99764	.99764
10 to 14	15 to 19	.99551	.99558	.99557	.99557	.99563	.99566	.99567	.99567	.99568	.99569
15 to 19	20 to 24	.99218	.99222	.99222	.99221	.99221	.99225	.99226	.99226	.99226	.99226
20 to 24	25 to 29	.99117	.99118	.99119	.99120	.99121	.99122	.99122	.99123	.99123	.99123
25 to 29	30 to 34	.99081	.99098	.99109	.99119	.99128	.99139	.99147	.99157	.99160	.99160
30 to 34	35 to 39	.98804	.98840	.98869	.98897	.98923	.98945	.98967	.98989	.99002	.99003
35 to 39	40 to 44	.98171	.98220	.98257	.98302	.98344	.98381	.98413	.98443	.98452	.98460
40 to 44	45 to 49	.97025	.97116	.97164	.97224	.97299	.97368	.97429	.97481	.97493	.97485
45 to 49	50 to 54	.95081	.95251	.95342	.95428	.95533	.95659	.95776	.95880	.95906	.95891
50 to 54	55 to 59	.92503	.92711	.92847	.92970	.93086	.93223	.93389	.93545	.93606	.93593
55 to 59	60 to 64	.88987	.89259	.89406	.89568	.89708	.89838	.90001	.90207	.90296	.90302
60 to 64	65 to 69	.84083	.84415	.84615	.84800	.85003	.85178	.85343	.85549	.85675	.85707
65 to 59	70 to 74	.77872	.78360	.78674	.78931	.79269	.79578	.79855	.80117	.80236	.80307
70 to 74	75 to 79	.69631	.70138	.70543	.70912	.71272	.71604	.71725	.72282	.72355	.72363
75 to 79	80 to 84	.59204	.58909	.59198	.59672	.60090	.60497	.60869	.61237	.61350	.61275
80 and over	85 and over	.37839	.38972	.39342	.39501	.40025	.40620	.41113	.41580	.41701	.41630
						FEMALE					
Births	Under 5	.97612	.97783	.97893	.97999	.98105	.98213	.98323	.98432	.98473	.98472
Under 5	5 to 9	.99633	.99642	.99644	.99649	.99657	.99666	.99672	.99678	.99682	.99682
5 to 9	10 to 14	.99829	.99831	.99833	.99834	.99835	.99837	.99839	.99841	.99841	.99841
10 to 14	15 to 19	.99789	.99791	.99791	.99790	.99792	.99793	.99793	.99793	.99793	.99794
15 to 19	20 to 24	.99689	.99693	.99695	.99696	.99698	.99700	.99703	.99704	.99705	.99705
20 to 24	25 to 29	.99606	.99616	.99623	.99628	.99634	.99639	.99646	.99652	.99654	.99654
25 to 29	30 to 34	.99477	.99495	.99507	.99518	.99528	.99538	.99548	.99561	.99565	.99565
30 to 34	35 to 39	.99253	.99277	.99297	.99315	.99333	.99348	.99363	.99378	.99387	.99387
35 to 39	40 to 44	.98867	.98901	.98927	.98959	.98985	.99011	.99034	.99056	.99063	.99067
40 to 44	45 to 49	.98262	.98323	.98358	.98399	.98448	.98492	.98534	.98571	.98582	.98578
45 to 49	50 to 54	.97395	.97485	.97534	.97581	.97637	.97703	.97763	.97819	.97836	.97829
50 to 54	55 to 59	.96177	.96304	.96383	.96454	.96523	.96603	.96696	.96782	.96813	.96810
55 to 49	60 to 64	.94175	.94407	.94538	.94676	.94800	.94919	.95060	.95226	.95292	.95297
60 to 64	65 to 69	.91152	.91427	.91597	.91754	.91921	.92068	.92209	.92380	.92432	.92502
65 to 69	70 to 74	.86390	.86747	.86975	.87197	.87399	.87617	.87801	.87976	.88063	.88128
70 to 74	75 to 79	.78621	.79113	.79429	.79755	.80072	.80355	.80665	.80918	.80961	.80972
75 to 79	30 to 84	.66506	.67174	.67367	.67707	.68059	.68397	.68683	.69013	.69042	.68928
80 and over	85 and over	.42319	.43400	.43528	.43681	.43788	.44132	.44437	.44695	.44725	.44612

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[1] Based on official life tables for 1960 published in: U.S. Public Health Service, National Center for Health Statistics, Vital Statistics of the United States, 1960, Vol. II, Mortality, Part A, table 2-1.

SOURCE: Current Population Reports, P-25, No. 286, July 1964, "Projections of the Population of the United States by Age and Sex: 1964 to 1985,: Table A-3.

Column VII Total Net Migration, 14 yrs. and over

Instructions: Subtract the Aged and Survived Current Year Population (Column V) from the Forecast Year Population (Column VI) for each age-sex cohort.

Note: It should be noted that net migration is only a source of supply if there is a net in-migration. If the net-migration estimate (Total, Column VIII) is positive, there exists a net in-migration of that amount. However, if the net-migration estimate is negative, there exists a net out-migration in that amount, and net out-migration must be analyzed as a demand, rather than a supply, item.

Column VIII Forecast Year CES Work Force Participation Rates

Source: This column's data should be obtained from Study Area Forecast Year CES Participation Rates, Column V, Worksheet II-2, contained in Chapter II of this Handbook.

Column IX Forecast Period Net Work Force Migration

Instructions: To obtain this column's data, multiply the Total Net Migration (Column VII) by the Forecast Year CES Work Force Participation Rates (Column VIII).

Section I

Occupational Transfers

The occupational supply sources discussed so far in this chapter account for all of the components which affect the aggregate labor supply, thus they constitute a complete system of data at that level.

When individual occupations are under consideration, however, attention must also be given to the shifting allocation of labor which occurs as people move from one occupation to another. Although these "occupational transfers" do not affect the total supply of labor, they do help determine the supply and demand for individual occupations. Moreover, this movement of manpower from occupation to occupation ranks high on the list of determinants of supply for occupations, but it has never been measured successfully in very great detail.

Despite the importance of this component to individual occupations, no satisfactory methodology has previously been developed for estimating the occupational effects of in-transfers, out-transfers, or the net effect of both. The problems of operational definition and empirical measurement are substantial. The job changes which would be counted as occupational transfers in any particular study depend significantly on the level of detail used in defining occupations in that study. Furthermore, longitudinal studies of the occupational changes of workers would be required to measure such changes directly and such studies are expensive. No detailed data of this sort are now available.

An alternative to direct measurement, for a historical period, is to treat occupational transfers as the residual between the total supply actually produced for each occupation during the period and the supply which is estimated to have been produced by the other supply sources and absorbed into employment.[3] The procedure described in this handbook takes such an approach in order to estimate net historical "occupational transfer rates"; the resulting rates are then applied to the forecast period to yield a forecast of occupational transfers.

The methodology involves the estimation of supply, the topic of this chapter. However, because the methodology requires the prior application of the allocation procedures discussed in Chapter V, and because it is procedurally similar to some of the allocation procedures discussed later, the methodology is presented as part of Chapter V. The absence of this particular estimate in no way detracts from either the completeness of the total supply estimates made in this chapter or the reconciliation undertaken in Chapter IV, because occupational transfers do not affect total supply. In addition, it is procedurally better to make the occupational transfer estimates after the reconciliation process of Chapter IV has been completed.

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[3] This is the approach used by Jaffe and Carleton in their study of Occupational Mobility in the United States, 1930-1960, (N.Y.: Columbia University), 1954.

CHAPTER IV

RECONCILIATION OF SUPPLY ESTIMATES

Having completed output estimates for the several supply sources affecting total labor supply, the analyst can now finalize both the aggregate supply and demand estimates and reconcile the two supply estimates.

It will be remembered that the work force supply projections and the employment demand estimates were earlier reviewed for technical accuracy and conceptual consistency (see Chapter II, Section D). The addition of the supply source output estimates adds another figure to the comparison. As will be seen below, the two sets of supply data can be treated in such a way that they should produce the same, or nearly the same, estimate of additions to the labor force.

Section A

Comparability of Output and Personal Characteristics Data

It may appear at first that the aggregate data on personal characteristics and the data describing the occupational output of the various supply sources are not comparable, because the data on personal characteristics relate to specific years and therefore employ what is essentially a stock concept, while the data on the output of occupational supply sources describe a flow over the forecast time period.

The nature of the two sets of data, however, permits this potential problem to be minimized. Since the age-sex information is available for both the current and forecast years, it is possible to describe the difference between the two dates as the change over time. It is not uncommon to find this "comparative statics" approach used to make intertemporal comparisons. Fortunately, most of the flows, like school output, are cumulative, i.e., the flows move in only one direction during the time period, either increasing the size of the work force or decreasing it. Information about such cumulative flows can be used in conjunction with comparative statics data. There is a greater problem with non-cumulative flows such as migration, which move in both directions, both increasing and decreasing the size of the work force. The problem arises because comparative statics is not necessarily an adequate representation of countervailing flows. However, even non-cumulative flows can be stated in terms which facilitate their use with comparative statics data, namely by treating only the net flow. The measurement of net flows, rather than the countervailing in- and out-flows, is, of course, frequently used out of statistical necessity. The qualitative differences between the gross in-flow and out-flow must be appraised, however, to determine how great the resulting error might be from considering only net flows. In the case at hand, the differences are judged to be small enough, and to affect a small enough portion of the supply sources, that comparability between the comparative static and the flow data is not seriously impaired. Thus, it is both technically possible and analytically useful to reconcile the two sets of data and then to use them in concert.

Section B

Calculating Additions to the Labor Supply

The first step in reconciling the two sets of supply data is to determine how many of the persons who will become available from each of the supply sources will actually constitute additions to the work force. This process is made necessary by the fact that a significant proportion of the people enrolled in schools are already employed and, therefore, currently in the work force. Even though most of those already employed will presumably change occupation upon leaving school, their changes in occupation affect only the allocation of presently available manpower among occupations; they do not constitute additions to the total supply of labor. To identify the additions to the labor supply requires one set of additional data, estimates of the extent to which persons in training programs are already employed. The following worksheet provides a framework within which the additions to the work force from the various supply sources can be estimated.

Instructions for

WORKSHEET IV-1: ESTIMATING ADDITIONS TO THE TOTAL WORK FORCE FROM FUTURE LABOR SUPPLY SOURCES

List each of the future supply sources. Identify as many individual schools in the treatment of drop-outs, general graduates, and vocational graduates as may facilitate the designation of employment percentages. Be sure that all future supply sources are included. (Note that current unemployment is omitted, since

WORKSHEET IV-1

ESTIMATING ADDITIONS TO THE TOTAL WORK FORCE FROM FUTURE LABOR SUPPLY SOURCES

Future Supply Source	Estimated Output Available to the Local Labor Market (I)	Percent Employed (II)	Percent Not Employed (III)	Additions to the Work Force (IV)	Source of "Percent Employed" (V)
Institutional Vocational Training Graduates					
Institution #1					
Institution #2					
(etc.)					
On-the-Job Vocational Training Graduates		100	0	0	by definition
Drop-outs					
Institution #1					
Institution #2					
(etc.)					
Military Returnees		0	100		by definition
Re-entrants		0	100		by definition
Net Geographic in-Migrants		0	100		by definition
Occupational Transfers		100	0	0	by definition
TOTAL, ALL SOURCES	____			____	

all unemployed are in the work force and therefore provide no additions to the labor supply.)

Column I Estimated Output Available to the Local Labor Market

Source: Estimates of future labor supply for the local labor market from sources as estimated in Chapter III.

Column II Percent Employed

Source: Only limited information is available about the extent to which persons are employed while in training programs or school. Thus, estimates must be made. Fortunately, some schools have studies which provide such data for their students. In Eugene, a study by the Office of Student Affairs at the University of Oregon entitled Student Biographical Characteristics, 1966-67, provided the necessary data for University of Oregon students by class rank.

Table 5

Class	Percent of Students Employed, Fall 1966
Total	34%
Freshman	19
Sophomore	30
Junior	36
Senior	42
Graduate	45

A similar study conducted by Lane Community College in 1968 provided the following data:

Table 6

Program	Percent of Students Employed
Occupational Preparatory	47%
College Transfer	54

National data on working patterns of students by age groups are also made available by the Bureau of Labor Statistics periodically and published as Special Labor Force Reports in The Monthly Labor Review. Those data tended to substantiate the general level of employment indicated locally by the schools in the Eugene study, and could probably be used if local data are not available. The more localized nature and the more useful categories of the local school data led to their use in the Eugene study.

The following table indicates the rates that were ultimately used in the Eugene study. It will be noted from the table that the appropriate percentages of already employed persons for O.J.T., service returnees, migrants, re-entrants, and occupational transfers can be determined *a priori*. The rates for the various other sources should be determined locally if possible; however, the following rates may be used if no better sources are available (next page).

Note: The figures in Table 7 are the percent from each source employed locally during training, not the percent of enrollees who will seek employment after leaving school.

Column III Percent Not Employed

Instructions: Take the difference between 100 percent and the percentage of persons employed appearing in Column II for each supply source.

Column IV Additions to the Work Force

Instructions: Multiply the number expected to enter the local labor market from each supply source (Column I) by the percent not already employed (Column III).

Column V Source of "Percent Employed"

Instructions: This "comments" column is to be used to cite the sources of the percent employed data. It is needed because percent employed data will not be available for every source, and some rates will have to be inferred from data for other sources.

Section C

Replacement Demand Generated by New Jobs

One additional adjustment may be required, depending upon the procedure used in estimating replacement demand due to work force withdrawals.

The traditional procedure for calculating demand created by work force

Table 7

Supply Source	Percent Employed	Source of Data
Institutional Vocational Program Graduates		
University of Oregon	41%	Percent of seniors who work--UO study
Lane Community College	47	Percent of Vocational Students who work--LCC study
High Schools	0	Estimated
Northwest Christian College	41	Presumed same as UO seniors
Private Vocational School	47	Presumed same as LCC vocational
Employer On-the-Job Training	100	By definition, on-the-job trainees are employed.
Drop-outs		
University of Oregon	34	All student average--UO study
Lane Community College Transfer Program	54	Percent of transfer students who work--LCC study
Lane Community College Vocational Program	47	Percent of vocational students who work--LCC study
High Schools	0	Estimated
General Program Graduates		
University of Oregon	41	Percent of seniors who work--UO study
Lane Community College	54	Percent of students who work--LCC study
High Schools	0	Estimated
Military Returnees	0	By definition none are employed locally in civilian jobs.
Re-entrants	0	By definition all are out of the labor market before re-entering.
Net Geographic In-Migrants	0	By definition none are employed locally at the time of their inmigration.
Occupational Transfers	100	By definition, all are working and therefore their occupational changes do not affect size of work force.

withdrawals is to apply withdrawal rates from national working life tables to employment at the survey date. This procedure yields an estimate of the number of people presently employed who will leave the labor market during the forecast period. However, this procedure ignores the additional replacement need that may develop as people leave new jobs, which will develop during the forecast period. In a rapidly growing area and over a substantial forecast period, the present procedure could lead to a substantial understatement of labor force withdrawals.

Procedures are available for estimating the replacement demand generated by new jobs; if such procedures are used in the demand estimating, there is no need for further adjustment here. If the replacement needs of new jobs have been ignored in the demand estimates, an estimate of the overall additional replacement demand needs to be made here.

The procedure is relatively simple. Assuming that expansion will occur at a roughly even pace throughout the forecast period, it can be assumed that during the forecast period the average number of new jobs will be half the total expansion.

Further, it is likely that labor force withdrawal rates will be somewhat lower for new jobs than for jobs existing as of the survey date, but that the difference will not be great. The aggregate replacement rate for old jobs for the forecast period can be determined simply by the division of the estimated replacement demand by employment at the time of the survey. That rate, or a slightly lower rate, can then be applied to the average number of new jobs during the forecast period (one-half the expansion).

Example:	Forecast employment	89,000
	Current employment	75,250
	Expansion	13,750
	Average new jobs (½ x 13,750) = 6,875	
	Replacement rate for existing jobs:	
	Estimated replacement	5,200
	Current employment	75,250
	Replacement rate (5,200/75,250)	6.9%
	Estimated replacement rate for new jobs	6 %
	Estimated replacement demand for new jobs	= 412

Section D

Comparison of Supply Forecasts

The estimation of new entrants to the labor force (section B) and replacement needs for new jobs (section C) complete the data needed for reconciliation. The following "Worksheet for Comparison of Supply Source Output and Work Force Projections" provides a mechanism for identifying any remaining discrepancy between the two sets of supply. Basically, it involves the comparison of forecast unemployment figures derived in two ways: first by a comparison of supply and demand which uses the supply source data, and secondly, by a comparison of forecast employment and projected work force. The data from the Eugene study are included for illustrative purposes.

Instructions for

WORKSHEET IV-2: WORKSHEET FOR COMPARISON OF SUPPLY SOURCE OUTPUT AND WORK FORCE PROJECTIONS

Supply

Item 1: Current Unemployment

Note: This figure is the CES estimate of unemployment at the time of the survey. (See Chapter III, Section A.)

Item 2: Forecast Additions to the Work Force

Source: The sum of "Additions to the Work Force (Column IV) of Worksheet IV-1, Worksheet for Estimating Additions to the Total Work Force From Future Labor Supply Sources.

Item 3: Forecast Supply

Instructions: Sum Current Unemployment (Item 1) and Forecast Additions to the Work Force (Item 2).

Demand

Item 4: Expansion

Instructions: Calculate the increase in employment forecast for the survey period.

Note: This item should include an estimate of expansion demand in all

WORKSHEET IV-2

COMPARISON OF SUPPLY SOURCE OUTPUT AND WORK FORCE PROJECTIONS

SUPPLY		
1.	Current Unemployment	5,050
2.	Forecast Additions to the Work Force	18,391
3.	Forecast Supply	23,441
DEMAND		
4.	Expansion (Total Employment)	13,750
5.	Replacement for Work Force Withdrawals (Total Employment)	5,200
6.	Replacement for New Jobs (if required)	412
7.	Forecast Demand	19,362
FUTURE UNEMPLOYMENT (Supply-Demand)		
8.	Forecast Supply	23,441
9.	Forecast Demand	19,362
10.	Future Unemployment (Supply - Demand)	4,079
FUTURE UNEMPLOYMENT (Work Force - Employment)		
11.	Projected Work Force	93,000
12.	Forecast Employment	89,000
13.	Future Unemployment (Work Force - Employment)	4,000
14.	Discrepancy	+79

---

employment. Consequently, if the employer survey data are limited to non-farm wage and salary employment, it will be necessary to expand the estimate of expansion demand to an estimate for total employment. (Procedures for making such estimates appear in Chapter V, Section A.)

Item 5: Replacement for Work Force Withdrawals

Instructions: Enter the replacement demand expected to be generated as a result of persons leaving the work force.

Note: This figure, like the others in this section, should represent total employment. If calculations have been made only for non-agricultural wage and salary employment, it will be necessary to expand them to include the other classes of employment as well. A procedure like that described in Section C of this chapter for estimating replacement demand for new jobs can be used.

Item 6: Replacement for New Jobs (if required)

Instructions: Enter the estimate described in "Replacement Demand Generated by New Jobs" (Section C of this chapter).

Item 7: Forecast Demand

Instructions: Sum the three demand components recorded in items 4 through 6 above.

Future Unemployment

Two methods of calculating unemployment are presented here, using the two sets of supply data.

Future Unemployment (Supply - Demand)

Item 8: Forecast Supply

Source: Item 3 above.

Item 9: Forecast Demand

Source: Item 7 above.

Item 10: Future Unemployment (Supply - Demand)

Instructions: Subtract Item 9 from Item 8.

Note: A negative unemployment figure indicates a shortage of labor.

Future Unemployment (Work Force - Employment)

Item 11: Projected Work Force

Source: Chapter II, Worksheet II-2, Column VII, "Study Area Forecast CES Work Force."

Item 12: Forecast Employment

Note: This figure is the forecast of total employment for the forecast year. Include all classes of employment.

Item 13: Future Unemployment

Instructions: Subtract Forecast Employment (Item 12) from Projected Work Force (Item 11).

Item 14: Discrepancy

Instructions: Subtract Future Unemployment (Work Force - Employment) (Item 13) from Future Unemployment (Supply - Demand) (Item 10) to get the discrepancy between the two sets of data.

Note: The two future unemployment figures are the estimates which must be reconciled, and this discrepancy indicates the size of the adjustment that must be made.

Section E

Reconciliation of Supply Forecasts

While small differences can be ignored, a large discrepancy between the unemployment figure produced by the supply source output estimates and that produced by the work force projections is a cause for some concern. In general, as indicated earlier, the work force projections and employment forecasts can be expected to be more accurate than the supply source data; therefore, the analyst can generally expect to look to the supply source data as the source of error. However, in a case where the supply source data produce a better fit with the employment demand data than do the work force projections, the analyst may be persuaded to take yet another look at the work force projection. (If a revision of the work force projections proves to be necessary at this stage, it should be remembered that the migration supply source estimate will also require revision.)

The result of this final review of the overall supply and demand estimates will be a final set of aggregate supply and demand figures. Once those final estimates are established, a reconciliation of the two sets of supply data can be made. This is accomplished by eliminating the discrepancy revealed by the preceding worksheet.

One means of eliminating the discrepancy is simply to pro-rate it among the supply sources and thence among the occupations. A somewhat more refined approach is to attempt to locate one or more spots in the supply source estimates where judgemental errors may have been made. This approach is particularly appropriate since some components of the supply source estimating procedure are more subject to such error than others. The following listing suggests the places in which such adjustments can most appropriately be made.

SUPPLY SOURCE AND ESTIMATE	SOURCE OF ESTIMATE AND TYPE OF ERROR
Institutional Vocational Training Graduates	
Forecast Output	These forecasts are made by the training institutions. High school figures may be in error because they lack well defined data. Private schools appear at times to forecast desired enrollment, thereby overstating output.
Percent to Seek Employment	Estimates are based mostly on impressions of school personnel. May be either too high or too low. Errors may have sizeable impact on large output figure.
On-the-Job Vocational Training Graduates	
Agency Output	Forecasts are hard to make due to the volatile nature of programs such as MDTA. May be slightly high or low.
Employer Output	Employers tend to under-report training and, therefore, output. Error will be small, however.
School Drop-outs	
Number of Drop-outs	Estimates are based on weak drop-out data and enrollment forecasts from schools; result may be too high or low.
Labor Force Participation Rates after Leaving School	Estimates are based principally on incomplete national data which are interpreted by the analyst. Estimates may be high or low. Probably one of the most likely sources of error.
Graduates of General Education Programs	
Percent to Seek Employment Locally	Based on impressions of school personnel. May be high or low. Although estimates are reasonably consistent, this may be a common source of error.
Labor Force Participation Rates After Leaving School	Partial national data require considerable interpretation by the analyst. Estimates may be high or low.
Military Returnees	
Forecast Number to Return	Use of past period to project forecast period output may slightly over or under estimate.
Labor Force Re-entrants	
Re-entrant Rates	Rates probably slightly underestimate actual re-entrances. Effect is slight, however.

SUPPLY SOURCE AND ESTIMATE	SOURCE OF ESTIMATE AND TYPE OF ERROR
Net Geographical Work Force Migration	Given the population estimate, there seems to be little potential for substantial error.
Calculating Additions to the Labor Supply	
Percent of Trainees Employed	Estimates are based on somewhat incomplete data. Small errors can have a sizeable impact on "additions to the labor supply." Estimates may be high or low.

While most of these sources probably contain only slight errors, even small erors in some of the estimated rates, when applied to large numbers, can cause sizeable absolute errors. Such estimates provide the most appropriate places for making necessary adjustment.

Section F

Interpretation of Aggregate Supply Data

It was noted in the introduction that the principal interest of occupational analyses is the supply and demand for individual, detailed occupations. Thus, the emphasis throughout the Handbook is on producing occupational supply forecasts for individual occupations. Nevertheless, aggregate data can make a significant contribution to a manpower study. Aside from contributing to the analysis of detailed occupations, the aggregate data contain a number of policy implications themselves, which should not be over looked. The following examples will illustrate the kinds of policy implications which can be drawn from the final aggregate supply estimates when combined with aggregate demand data.

A Future Labor Shortage.—An overall shortage of labor would be indicated in the data by an unemployment rate below 1.5 percent. A situation in which employment demand exceeded work force supply (negative unemployment) would be included in this category. (See Chapter II, Section D, for a discussion of the conceptual interpretation of the unemployment estimates produced by these supply and demand data.) Such an overall shortage of labor would undoubtedly suggest efforts to encourage in-migration (or discourage out-migration, if that has been the area's pattern) along with housing and employment services necessary to orient and train in-migrants for the types of jobs available in the study area. Shortages would also seem to suggest efforts on the part of employers to increase efficiency in the use of labor, especially in the occupations in which workers are in shortest supply, by re-evaluating job duties, using more over-time, etc. An additional way to relieve labor shortages is, of course, to increase the labor-force participation of the existing population by encouraging, training, and employing women, youth, minority group members, and older workers whose labor force participation is often relatively low.

The aggregate data provided by this methodology facilitate the kind of analysis just suggested, and can be used to test the appropriateness of these and other policy alternatives. Detailed occupational data will, of course, reveal other generalizations about such things as the adequacy of training programs, shortage occupations, and the like.

A Future Labor Surplus.--When the comparison of the work force and employment data yields an unemployment rate above six percent, the general context of the study is one of labor surplus. Comparison of the personal characteristics of the work force in the current and forecast years will indicate the types of workers whose supply will grow most rapidly and who may have the greatest problems being absorbed.

The policy implications of projected labor surpluses are as varied as those of labor shortages. Acceleration of out-migration can be encouraged by, for instance, offering vocational education in high schools for jobs outside the area and by making information about such jobs readily available to the study area's populace. Surpluses can also be reduced by efforts to lower labor force participation rates through early retirements and longer schooling. Industrial development efforts are appropriate in reducing local labor surpluses, especially if they are directed toward industries which use the labor skills available in the study area. Providing recruiting facilities and training the local labor force for new jobs also encourages new firms to hire local people.

While the above are only suggestive, they indicate the kinds of policy conclusions which can be drawn when aggregate as well as detailed supply data are available as part of an occupational study.

CHAPTER V

ALLOCATION OF AGGREGATE SUPPLY SOURCE DATA BY OCCUPATION

Chapter III presented procedures for estimating the total supply of manpower which can be expected to flow from eight of the nine occupational supply sources. (It will be remembered that the ninth, occupational transfers, remains unquantifiable.) For three of the sources—current unemployment, institutional vocational training, and on-the-job training—the procedures for estimating total output described in Chapter III also yield information about the specific occupations for which the supply will be available. However, the procedures used to estimate total output from the other six supply sources do not produce corresponding information about the probable occupational attachment of the forecast output. The purpose of this chapter is to describe ways of allocating the forecasts of supply from: school drop-outs (high school, community college, and university), graduates of general education programs (high school, community college, and university), military returnees, labor force re-entrants, and geographic migrants (net), and to estimate net occupational transfers.

Generally speaking, the methodologies presented in this chapter rely upon information about the personal and education characteristics of the supply together with information about the occupations where people with similar characteristics find employment. For example, people who enter the labor market upon dropping out of high school are young and have low educational development. It seems most appropriate therefore, to allocate the estimated number of such people to occupations with minimal education requirements where young people commonly find employment. Similar reasoning is applied to the other supply source categories. The necessary personal and educational characteristics of the various categories of supply can either be inferred from the definition of the group, or they can be ascertained from data developed in Chapter III.

The occupations in which people with certain personal and educational characteristics find employment can be identified through the use of two related pieces of information. Data about the occupations in which persons of certain age-sex groups are employed is readily available from the employment demand side of the study. In addition, the general educational level required for various occupations is used to allocate school drop-outs and general education graduates. That information is available from the Dictionary of Occupational Titles (Third Edition) in the form of an index of General Educational Development (G.E.D.). More is said about the G.E.D. and the procedures for its use in Section A.

As the specific allocation procedures for the several supply sources are discussed in the following sections, it will be noted that some of the allocation procedures are quite firmly grounded in empirical evidence, while others rely much more heavily on judgemental deductions. There are presently no data available with which to verify the allocation methodologies described in this chapter, but they appear to produce reasonable results, at least in the Eugene study. The fact that these methodologies are based on a systematic set of judgements and on at least some reliable data constitutes the chief merit of this approach and makes these procedures much more defensible than the alternatives--ignoring the allocation or engaging in guesswork. The availability of a consistent set of techniques does not eliminate the need for informed, analytical judgement; it only provides a framework within which such judgement can be effectively applied. The study of each occupation's particular characteristics and intimate knowledge of local labor markets are still essential components of the estimating process. The local labor market analyst should not hesitate to make hand adjustments in the allocations produced by these methodologies as his knowledge of the area dictates. Only by the addition of such adjustments can the allocation of supply to detailed occupations reflect the unique qualities of particular labor markets.

Section A

Procedure for Determining Employment in Categories Not Covered By Employer Survey

The supply estimates developed in this Handbook are estimates of total supply, not just that going to non-agricultural wage and salary jobs; consequently all industries and classes of workers must be considered in the allocation process. Unfortunately, occupational employment demand estimates often deal only with non-agricultural wage and salary employment (a problem which was also encountered in Chapter IV, Section D). This is usually the case with demand estimates which are based on employer surveys, and it may be the case as well when other methodologies are used. In such circumstances, non-agricultural self-employed, unpaid family workers, and domestics, and the agriculture industry are not included in the demand data. Therefore, it may be necessary to use other sources to obtain employment data for allocation purposes.

For those demand areas not covered by employer surveys, some crude estimates can be made from the Census of Population and the Current Employment Statistics (C.E.S.) program. There are several problems involved in using the Census which preclude extensive analysis of its data. First, there is the problem of the age of the data. The Census data relate to 1960, while the survey date may be several years later. Secondly, Census data on age by occupation are available only for states, so the study area age distribution within occupations must be assumed to be like that of the state. Finally, there is the additional problem of matching the age groupings of the Census data to the age cells used in the employment study. Despite these drawbacks, estimates can be made which are sufficient for the allocation purposes.

In general, the procedure for making the employment estimates uses the age profile of the state Census data to estimate the age profile of the current study area employment in the various categories. The latter estimates are available from the C.E.S. program.

The procedure used for getting an age distribution for the C.E.S. county totals for self-employed persons, unpaid family workers, domestics, and the agriculture industry are presented with reference to Worksheet V-1.

Instructions for

WORKSHEET V-1: ESTIMATING OCCUPATION AND AGE FOR SELF-EMPLOYED, UNPAID FAMILY, DOMESTIC, AND AGRICULTURE EMPLOYMENT CATEGORIES

Columns I, III, V, VII, IX, XI, XIII, XV, XVII, XIX Census Data

Instructions: Enter Census employment data for each employment category by age and sex in the odd numbered columns. Enter in Column I total employment for each employment category. Sum the figures for the three non-agricultural categories--self-employed, unpaid family, and domestics (SUD)--in Column I only and enter the total on the first line of Column I.

Source: Census of Population, Table 123.

Note: The figures for male and female employment are to be entered separately.

Column II

Instructions For the two employment categories, SUD and Agriculture, enter employment for the survey date as estimated by the C.E.S. program. Both estimates can be entered directly on the worksheet.

Columns II, IV, VI, VIII, X, XII, XIV, XVI, XVIII, XX Allocated C.E.S. Employment

Instructions: To allocate the C.E.S. current estimate of SUD employment by age and sex, first divide the C.E.S. figure appearing on the first line of Column II by the corresponding Census total appearing in Column I to get an allocation factor. Secondly, multiply each age-sex-employment category Census figure by the allocation factor to get the allocated C.E.S. estimate. Enter the results in the appropriate lines of the even numbered columns.

Repeat this process for the agricultural industry figures.

When this worksheet has been completed, the data are available to complete the allocation of the supply estimates. Various data from this worksheet will be used in the several sections that follow.

Differences in age categories present some problems in the use of Census-based data. The following table shows the way in which the age groups of the employer survey data and the Census derived SUD and agricultural estimates were related to each other in the Eugene study.

Table 8

Supply Source	Approximate Age on Entering the Labor Market	Relevant Survey Age Categories	Relevant Census Age Categories
Drop-outs			
High School	14-18	Under 22	14-17, 18-19
Community College	18-21	Under 22	18-19, 20-24
University	18-22	Under 22	18-19, 20-24
General Education Graduates			
High School	17-19	Under 22	14-17, 18-19
Community College	20-22	Under 22	20-24
University	21-28	Under 22, 22-34	20-24, 25-29, 30-34
Military Returnees	18-28	Under 22, 22-34	18-19, 20-24, 25-29
Female Re-entrants	20-64	Under 65	Under 65
Migrants	All	All	All

WORKSHEET V-1: ESTIMATING OCCUPATION AND AGE FOR SELF-EMPLOYED, UNPAID FAMILY, DOMESTIC, AND AGRICULTURE EMPLOYMENT CATEGORIES

Employment Category and Sex	TOTAL		Age Groups							
			14-17		18-19		20-24		25-29	
	Census	C.E.S.	Census	C.E.S.	Census	C.E.S.	Census	C.E.S.	Census	C.E.S.
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Non-agricultural Self-employed, Unpaid Family, and Domestic Workers										
Self-employed										
Male										
Female										
Unpaid Family Workers										
Male										
Female										
Domestics										
Male										
Female										
Agriculture										
Male										
Female										

WORKSHEET V-1 (Cont.)

Employment Category and Sex	Age Groups									
	30-34		35-44		45-54		55-64		65+	
	Census	C.E.S.	Census	C.E.S.	Census	C.E.S.	Census	C.E.S.	Census	C.E.S.
	(XI)	(XII)	(XIII)	(XIV)	(XV)	(XVI)	(XVII)	(XVIII)	(XIX)	(XX)
Non-agricultural Self-employed, Unpaid Family, and Domestic Workers										
Self-employed										
Male										
Female										
Unpaid Family Workers										
Male										
Female										
Domestics										
Male										
Female										
Agriculture										
Male										
Female										

Unlike the occupations covered in the employer survey, a G.E.D. rating is not assigned to the SUD and Agriculture employment estimates. Because these categories include a wide variety of occupations, such a rating would be so broad that the results would lack meaning. Instead, a judgement has been made as to which of these employment categories should be used in allocating each of the supply sources. For example, high school drop-outs can be expected to enter unpaid family work, domestic work, and agriculture, but they are judged generally unlikely to undertake self-employment to any significant degree. The following table specifies the relationships established in the Eugene study.

Table 9

Supply Source	Self-Employment	Unpaid Family Work	Domestic Work	Agriculture
Drop-outs				
High School		X	X	X
Community College		X	X	X
University		X	X	X
General Education Graduates				
High School		X	X	X
Community College	X	X		X
University	X	X		
Military Returnees	X			X
Female Re-entrants		X	X	X
Migrants	X	X	X	X

Further reference will be made to material of the type contained in this table as allocation procedures are spelled out in the following sections. Consequently, it will be appropriate to prepare a table of this kind for the study area.

Section B

Allocating School Drop-outs and General Education Graduates

The total number of school drop-outs and graduates of general education programs who will become available for employment has been estimated (see Chapter III, Sections D and E); however, the estimates do not indicate the occupations into which the supply is likely to flow. Allocating those estimates is the purpose of this section. The procedures presented here take advantage of the detailed data developed in Chapter III regarding the types of schools--high schools, 2-year community colleges, or 4-year universities—from which the drop-outs and general education graduates will come. From those data it is possible to infer both the age and educational attainment of the supply components. Following the general approach used throughout this chapter, the forecast supply from these sources can then be allocated to occupations where persons of similar age and educational development find employment.

Before proceeding further, it will be helpful to describe more fully the use of the General Educational Development (G.E.D.) index in this allocation process. The G.E.D. index indicates the level of "(a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges such as language and mathematical skills. It is education of a general nature which does not have a recognized, fairly specific, occupational objective."[4] The G.E.D. level indicated for an occupation is that required to achieve average success in the occupations. The required level of G.E.D. (and certain other requirements for each 6-digit occupation) is published in a supplement to the D.O.T. entitled Selected Characteristics of Occupations.[5] By the use of this supplement, it is possible to assign a G.E.D. index code to each of the occupations in the study. The identification of the occupations into which people from each of the supply sources should be allocated is then simply a matter of translating between the G.E.D. requirements of occupations and the years of formal schooling indicated by the supply data. In the Eugene study, the translation between G.E.D. and years of schooling was approached in two ways. First, a judgemental equation of the two scales was made. For instance, job seekers from among high school drop-outs (less than 12 years of formal education) were judged to have enough education to be employed in occupations requiring G.E.D. levels 1 and 2. When this process had been completed for all categories of drop-outs and general education graduates, a second comparison was made. The occupations were arranged by G.E.D. level, and reviewed on a judgemental basis to determine how well the occupations at each level corresponded with the occupations in which persons from the various supply sources are known to find work. This review led to some minor changes in the G.E.D. categories assigned to each supply category. The resulting scale for the supply sources in which G.E.D. was used is shown below:

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[4] U.S. Department of Labor, Dictionary of Occupational Titles, Vol. II: Occupational Classification and Industry Index (2 Vols., 3d Ed.; Washington, D.C.: U.S. Government Printing Office, 1965) p. 651.

[5] U.S. Department of Labor, Selected Characteristics of Occupations: A Supplement to the Dictionary of Occupational Titles (3d Ed., Washington, D.C.: U.S. Government Printing Office, 1966)

Table 10

Supply Source	G.E.D.
School Drop-outs	
High School	1-2
Community College	2-4
University	3-4
Graduates of General Education Programs	
High School	1-3
Community College	3-4
University	5-6

While this scale was developed from data in the Eugene study, it is probably directly transferrable to many other areas. Alternatively, the process described above can be readily repeated for other areas.

(Initially, efforts were made to control on Specific Vocational Preparation (S.V.P.) as well as age and G.E.D. S.V.P. is another D.O.T. index which describes the length of time required to qualify for a specific occupation. This variable was found to be strongly correlated with G.E.D. and negatively correlated with the number of young people employed in an occupation. Consequently, it proved to be almost totally redundant once the age and G.E.D. criteria had been applied. Therefore, it was dropped.)

Once the occupational employment data have been designated as to G.E.D. level, the process of allocating drop-outs and general education graduates can be accomplished in essentially three steps: (1) identifying the appropriate occupations, (2) determining the amount of employment in the appropriate age group in each occupation, and, finally, (3) allocating the estimated number of drop-outs and graduates. The allocation of drop-outs and general education graduates from all three categories of schools (high schools, community colleges, and universities) involves the use of Worksheet V-2.

Instructions for

WORKSHEET V-2: ALLOCATING SCHOOL DROP-OUTS AND GENERAL EDUCATION GRADUATES TO OCCUPATIONS

Column I Occupation

Instructions: Enter in this column the occupations arranged by their G.E.D. rating (all occupations with a G.E.D. "1" first, "2" second, etc.) Note: The analyst may shorten the calculations by allocating the general education graduates and drop-outs to only the most significant occupations in terms of employment. If machine processing is available, it is appropriate to allocate to all occupations; however, when the allocation is done by hand, the number of calculations can be substantially reduced by listing, as a maximum, only those occupations which will yield allocated supply of one or more. This approach is advantageous since employer surveys yield many occupations in which very few persons are employed; these can be ignored in this worksheet without adversely affecting the allocation. While the number allocated to an occupation by this process depend upon the age profile of employment, an approximate cut-off point can be established by dividing employment of the appropriate ages by the total supply from the particular supply source in question. The resulting figure indicates approximately the amount of employment required before one person will be allocated to that occupation; occupations with employment substantially below that level can effectively be ignored in the allocation.

Include the appropriate entries for self-employed, unpaid family workers, domestics and agriculture, as indicated in Table 8.

Column II Employment of Appropriate Age Group

Instructions: Enter current employment of the appropriate age for each occupation. Enter intermediate employment totals for each G.E.D. rating. Source: Information for most occupations is available from the employer surveys. Employment categories not available from that source can be estimated from Census data as explained in Section A (see Worksheet V-1). Note: With one exception the appropriate age group is the group under 22. The exception is occupations for college graduates, where a relatively wide age range makes necessary the use of employment in two age groups. For this group only, the appropriate age group includes data for persons "under 22" and those "22-34." Consequently, for occupations to which college graduates are to be allocated (see Table 8), it will be necessary to record employment of more than one age group. Note that this will also be necessary for self-employed, unpaid family, domestic, and agriculture employment categories.

Columns III, IV, V, VI, VII, VIII Allocation of Drop-outs and General Education Graduates

Step 1: Completion of Lines 1-5

Line 1: G.E.D. Range

Instructions: Enter the G.E.D. range for each supply source.

Source: Table 10 of this section.

Line 2: Age Range

Source: Table 8, Section A.

Line 3: Employment

Instructions: Enter the total employment of the appropriate age and G.E.D. range indicated in Lines 1 and 2. Include employment in the appropriate self-employed, unpaid family, domestic, and agriculture categories (see Table 8).

Source: Column 2.

Line 4: Total Supply

Instructions: Enter the total forecast supply from each supply source as estimated in the various sections of Chapter III.

Line 5: Allocation Factor (for each source)

Instructions: For each column, divide the estimated supply generated by each supply source (Line 4) by the employment of the appropriate age group and G.E.D. range (Line 3) for each supply source.

Step 2: Allocation of Supply to Specific Occupations

Instructions: For each column, multiply the employment entered in Column II for each occupation by the allocation factor appearing in Line 5. Apply the allocation factor for each supply source to the relevant employment of all those occupations which fit the G.E.D. limitations of that source.

WORKSHEET V-2

ALLOCATING DROP-OUTS AND GENERAL EDUCATION GRADUATES TO OCCUPATIONS

Occupation	Employment of Appropriate Age Group	High School Drop-outs	High School Graduates	Community College Drop-outs	Community College Graduates	University Drop-outs	University Graduates
(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
1. G.E.D. Range	-						
2. Age Range	-						
3. Employment	-						
4. Total Supply	-						
5. Allocation Factor	-						
G.E.D. Group 1							
Occupation A							
Occupation B							
Occupation C							
G.E.D. Group 2							
Occupation A							
Occupation B							
Occupation C							

Note: Each resulting product is the number of the given supply who are likely to be available for employment in the occupation.

Section C

Allocating Military Returnees To Detailed Occupations

Persons returning from military service constitute another category of supply whose total number was estimated in Chapter III and which must now be allocated to specific occupations. It will be remembered that the estimate of the total number of military returnees is based upon records of returning servicemen available from the Selective Service System (see Chapter III, Section F). Those records yield information about the ages of returnees as well as their total number. Consequently, it is possible to base the allocation of the age groups of returnees.

Unfortunately, very little information is available about the educational level of military returnees. The Selective Service System records which yield the age data are of no use for this purpose, and there are no regularly published reports which contain the desired information. It is known that men with college degrees are much more likely to avoid military service altogether than are their less educated counterparts;[6] therefore, it is likely that military returnees will be somewhat below average in years of schooling.

Whatever overall educational biases exist in the Selective Service System, age and educational level appear to be positively correlated at entry into the armed services[7], so they probably are also correlated at separation. It is probably the case, therefore, that the older returnees, on the whole, are better educated than the younger returnees.

The training and experience acquired in the armed services may be at least partially compensating; although most studies indicate that the skills learned in military service are not readily transferred to civilian employment.

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[6] Walter Y. Oi, University of Washington, "The Costs and Implications of an All-Volunteer Force," reprinted in Extension of the Universal Military Training and Service Act (Hearings Before the Commission of Armed Services, House of Representatives, Ninetieth Congress, First Session, May 2, 3, 4, 5, 9, 10, and 11, 1967) pp. 2142-3.

[7] The following table indicates the relationship of age and education at

On the basis of the available information, it seems most appropriate to allocate military returnees strictly on the basis of age, and to allocate them to occupations held by other men of similar ages. The fact that most returnees are relatively young results in an allocation of most returnees to entry occupations. The following data for Eugene illustrate the point:

Age	Percent of Returnees
Total	100%
Under 22	53
22-26	36
26-34	9
35-44	2
45 and over	0

Worksheet V-3 provides a method for allocating military returnees according to the principles discussed above.

Instructions for
WORKSHEET V-3: ALLOCATING MILITARY RETURNEES

Column I Occupation

Instructions: List all the occupations being included in the study. In-

---

entry into armed service:

Years of School Completed (Percent of All Accessions)

Age	Total	0-11	12	13-15	16+
Under 21	59.79	26.58	29.51	3.69	.01
21-23	25.71	3.79	10.10	6.70	5.12
24 and over	14.50	2.53	4.12	2.75	5.09

Source: Walter Y. Oi, University of Washington, "The Costs and Implications of an All-Volunteer Force," reprinted in Extension of the Universal Military Training and Service Act, p. 2142, Table 2.

clude categories for self-employed and agriculture employment classifications not covered by the employer survey.

Columns II and IV Current Employment by Age Groups

Instructions: First, enter the estimated total number of male employees in the study area for each age group on the "Total" line.

Secondly, enter employment in the appropriate age group for each of the occupations being included in the study.

Note: The total employment line items must include employment in the categories of self-employment and agriculture, which are not covered by the employer survey. (See Section A for estimates of such employment.)

Columns III and V Military Re-entrants by Age Groups

Instructions: First, enter the total forecast number of military reentrants in each age group on the "Total" line.

Secondly, divide the number of military returnees in each age group by the total employment of the corresponding age as it appears in the preceding column. This process yields allocation factors.

Thirdly, multiply each occupational employment figure by its allocation factor to determine the number of military returnees allocated to each occupation. Record these figures in the appropriate odd-numbered columns.

Source. The forecast number of military returnees of each age group are to be found in Chapter III, Section F.

Column VI Total Military Returnees

Instructions: For each occupation, sum the allocated military returnees from Columns III and IV.

WORKSHEET V-3

ALLOCATING MILITARY RETURNEES

Occupation (I)	Male Employment Under 22 (II)	Returnees Under 22 (III)	Male Employment 22 and Over (IV)	Returnees 22 and Over (V)	Total Returnees (VI)
Total					
Occupation A					
Occupation B					

Section D

Allocation of Female Re-entrants To Detailed Occupations

The typical working life of women begins with a brief period of employment immediately upon leaving school, which is terminated at marriage or the birth of the first child. This is followed in many cases by a return to paid work after the last child has reached school age. Precise information about the average length of absence from the labor market for such women is not available, but an examination of various data suggests that it is probably between 10 and 18 years. In any case, "The far greater portion of a woman's work life occurs after she has raised her family and re-entered the labor force."[8] In fact, the working life expectancy for 35-year old women who no longer have young children is essentially the same as for newly married 20-year olds.[9]

The following table demonstrates the rather young age of women at withdrawal compared with the age at which women re-enter the labor market.

Labor Force Withdrawals and Re-entrances of U.S. Women, 1960

	Withdrawals of Potential Re-entrants		Re-entrances	
Age	Percent of Total	Cumulative Percent	Percent of Total	Cumulative Percent
TOTAL	100%		100%	
14-19	25	25%	0	0
20-24	51	76	1	1%
25-29	14	90	8	9
30-34	5	95	17	26
35-39	3	98	22	48
40-44	1	99	22	70
45-49	1	100	15	85
50-54	0		9	94
55-59	0		4	98
60-64	0		2	100
65-over	0		0	

Source: Bureau of Labor Statistics, Tomorrow's Manpower Needs

Note: The withdrawal data include only those due to marriage and birth of children, since separations due to death and retirement are not factors in female re-entrances. The re-entry data include only accessions due to children reaching school age and loss of husband. Accessions due to age are, for the most part, initial entrances rather than re-entrances.

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[8] U.S. Department of Labor, Manpower Report of the President (Washington, D.C.: U.S. Government Printing Office) 1967, p. 134.

[9] Ibid.

Women who return to the labor market can be expected to bring with them some of the skills they had used during their earlier employment, but those previously developed skills will have deteriorated from lack of use. Moreover, the typically young age at withdrawal suggests that employment skills may not have been highly developed at the time of withdrawal. Consequently, both a lack of skill and the deterioration of skill work against successful re-employment. However, these shortcomings will have been at least partly mitigated by an increase in the various factors associated with maturity. It can be shown that younger women are more likely to be employed in certain occupations than are older women, many of whom are themselves recent additions to the labor force. National data indicate, for instance, that 47 percent of the women workers 20-24 (ages when 51 percent of the withdrawals occur) work at clerical jobs, compared to only 31 percent of the women employees 35-44 (when 44 percent of the re-entrances occur).[10] These data suggest that many women do not re-enter their prior occupations, but enter entirely new occupational areas upon returning to the labor market. Since prior occupational skills do not seem to be the crucial factor in determining the occupation of re-entry for many women, it does not seem entirely appropriate to attempt to assign re-entrants to the occupations they left at the time of withdrawal. Although re-entrants will presumably not have progressed as far occupationally as women who continued working, it does seem appropriate to give some weight to the kinds of occupations typically held by more mature women.

Besides the personal qualifications of the re-entrants, the allocation process should take account of the kinds of jobs existing in the area. Whereas an attempt to allocate re-entrants to previously held occupations would require a distribution on the basis of occupational patterns as they existed at some past period, a technically difficult task, the apparent fact that many women do not return to their old occupations makes it perhaps more appropriate to deal with the current occupational profile. This process of allocation on the basis of current employment also helps compensate for a bias in the calculation of replacement demand due to female labor force withdrawals. That process takes account only of the age and sex of workers in estimating withdrawals, and does not reflect the differences in withdrawal rates which are attributable to occupation rather than age or sex. By calculating re-entrants in the same manner, one can at least partially compensate for the error in the estimation of withdrawals.

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[10] Calculated from Bureau of Labor Statistics, Labor Force and Employment in 1965 (Special Labor Force Report Number 69), Table C-8.

Since the methodology for deriving the forecast of total re-entrants yields data on age at the time of re-entry, it is possible to take some account of the ages of re-entrants in the allocation process. Procedurally, therefore, the methodology calls for the allocation of re-entrants to occupations in the study area on the basis of current employment of females some years younger than the re-entrants in question, the exact number of years depending on the age at reentrance. This process reflects both the possiblity of re-entrants' returning to prior occupations and the possibility of entrance into occupations generally held only by women more nearly the age of the re-entrants.

Instructions for

WORKSHEET V-4: ALLOCATING FEMALE RE-ENTRANTS TO DETAILED OCCUPATIONS

Column I Occupations

Instructions: Enter the titles of occupations to be analyzed in the study.

Note: This allocation process can readily be done by computer, in which case it will be easiest to include all the occupations in the study. If it is to be done by hand, however, the work can be substantially reduced by listing only occupations in which there is enough female employment to yield one or more re-entrants in the allocation. See the discussion of this point in Section B, Worksheet V-2.

In addition to the occupations with wage and salary employment, include lines for components of total employment for which occupational designations are not available, i.e., unpaid family workers, domestics, and agriculture. (See Table 9.)

Columns II, IV, VI, VIII Female Employment

Instructions: Enter the total number of female employees in the appropriate age categories on the "total" line. For each occupation listed in Column I, enter the number of females currently employed in each occupation.

Source: Most of these data are available from the employer survey. For employment categories not covered by the employer survey, see Section A.

Columns III, V, VII, IX Re-entrants

Instructions: Conceptually, the methodology used here pro-rates the estimated number of re-entrants among occupations on the basis of

WORKSHEET V-4

ALLOCATING FEMALE RE-ENTRANTS TO DETAILED OCCUPATIONS

Occupations (I)	Female Employment Under 22 (II)	Re-entrants 20-24 and 25-34 (III)	Female Employment 22-34 (IV)	Re-entrants 35-44 (V)	Female Employment 35-44 (VI)	Re-entrants 45-54 (VII)	Female Employment 45-54 (VIII)	Re-entrants 55-46 (IX)	Total Re-entrants (X)
TOTAL									
Occupation A									
Occupation B									
Occupation C									

current employment in those occupations. The number of calculations required to complete the allocation process can be kept to a minimum by the following procedure.

First, enter in the "Total" lines of these columns the total number of re-entrants in each age group from Worksheet III-7, Column IV.

Secondly, divide that figure by the total number of female employees of that age group appearing on the "Total" line of the preceding column.

Thirdly, multiply each occupational employment figure by the resulting quotient to determine the number of re-entrants allocated to each occupation.

Note: Since only six percent of the re-entrants are in the age group 55-64, the analyst may choose to allocate them in accordance with the percentages of employment 35-44 (Column VI) rather than 45-54 (Column VIII). Such an approach would save time and would only slightly change the estimated occupational distribution, because relatively few re-entrants are involved.

Column X Total Re-entrants by Occupation

Instructions: For each occupation, sum the estimated number of re-entrants from the odd numbered columns.

Section E

Allocating Migrants to Detailed Occupations

The allocation of migrants, like the allocation of the other supply components discussed in this chapter, relies on information about the personal characteristics of migrants, and it rests on the assumption that the occupations for which they can most appropriately be considered as supply are in some way related to the occupations in which residents with certain personal characteristics have been successful in finding employment. In the case of migrants, reasonably accurate, detailed data are available about their age and sex from the forecasts developed in Chapter III (see Chapter III, Section H).[11] Comparable data, are, of course, available with regard to persons currently employed in the area. Consequently, the means are available for relating migrants to current employment in the study area on the basis of age and sex. Unfortunately, little is known about the prior occupational experiences of migrants or the types of occupational changes which occur when people move from one labor market area to another. The evidence that is available about migration indicates that it is positively correlated with the following variables: education, unemployment, age 20-34, middle level income, and prior residence in a rural area. Census data indicate that about half of the recent in-migrants to the Eugene area were persons from other states, while about half were from other counties within the state. A similar pattern was exhibited in other counties of Oregon and the United States. With half the migrants coming from outside the state, it seems likely that there would be some disparity between the prior occupational attachment of the migrants and the occupations existing in the study area, especially if the study area exhibits a sizeable degree of industrial specialization.

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[11] It should be remembered that the migration figures being considered here describe net migration, i.e. the excess of in-migration over out-migration, or the excess of out-migration over in-migration. Net out-migration would, of course,

Whatever the occupational experience of migrants, it must surely be true that many migrants relocate with new occupations as well as new surroundings in mind. Therefore, migrants' prior occupations are only partially relevant to the kind of work that they will seek in their new places of residence. Whether changes in occupation which may be associated with migration would, on the average, constitute upgrading or downgrading is also open to speculation. The tendency of people to move from rural and depressed areas to ones of greater economic opportunity, the fact that at least some people move for better jobs, and the practice of corporate promotion through geographic re-assignment all suggest that some occupational upgrading occurs with migration. On the other hand, the fact that migrants may bring skills that are inappropriate to their new area and the other fact that some people tend to overrate their own employability and the opportunities in the new area suggest that some downgrading of skill also occurs when people relocate. Whether or not the net effect is upgrading or downgrading is not at all obvious; but in either case it probably does not constitute a major change.

Whatever the prior occupational attachment of migrants and whether upgrading or downgrading is the net effect of their relocation, they will, of necessity, become available for the kinds of jobs that exist in the study area. Migrants are

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appear as a demand item in the analysis. The estimating and allocation procedures would be the same in either case.

relatively well equipped to make whatever changes are necessary to accomplish this adjustment, since they tend to be of an adaptable age (20-34 years) and of above average education. In view of these facts and the lack of sufficiently precise information to warrant special adjustments, it seems most appropriate to allocate migrants to occupations on the basis of current local employment of the same age and sex category as the migrants. Worksheet V-5 below is designed to accomplish the allocation.

The procedures used in Worksheet V-5 follow very closely those used in earlier sections in this chapter, and, like the others, they are readily adaptable to machine processing.

Instructions for

WORKSHEET V-5: ALLOCATING MIGRANTS TO DETAILED OCCUPATIONS

Column I Occupation

Instructions: List all the occupations being included in the study. Include categories for any employment classifications not covered by the employer survey, i.e. self-employed, unpaid family workers, domestics, and agricultural workers.

Columns II, IV, VI, VIII, and X Current Employment by Age Groups

Instructions: First, enter the estimated total number of employees in the study area of each age on the "Total" line.

Secondly, enter employment in the appropriate age group for each of the occupations being included in the study.

Note: The total employment line items must include employment in categories which are not covered by the employer survey. (See Section A for estimates of such employment.)

Columns III, V VII, IX, XI Migrants by Age Groups

Instructions: First, enter the total forecast number of migrants in each age group on the "Total" line.

Secondly, divide the total number of migrants in each age group by the total employment of the corresponding age as it appears in the preceding column. This process yields allocation factors.

Thirdly, multiply each occupational employment figure by its allocation factor to determine the number of migrants allocated to each occupation.

WORKSHEET V-5: ALLOCATING MIGRANTS TO DETAILED OCCUPATIONS

Occupation (I)	Employment Under 22 (II)	Migrants 14-19, 20-24 (III)	Employment 22-34 (IV)	Migrants 25-34 (V)	Employment 35-44 (VI)	Migrants 35-44 (VII)	Employment 45-54 (VIII)	Migrants 45-54 (IX)	Employment 55-64 (X)	Migrants 55-64, 65+ (XI)	Total Migrants (XII)
TOTAL											
Occupation A											
Occupation B											
Occupation C											

Record these figures in the appropriate odd-numbered columns.

Source: The forecast number of migrants of each age group are to be found in Chapter III, Section H, Worksheet III-8, Column IX.

Column XII Total Migrants

Instructions: For each occupation, sum the allocated migrants from the odd-numbered columns.

Section F

A Methodology for Estimating Occupational Transfers

It was pointed out earlier (Chapter III, Section I) that occupational transfers pose particularly difficult estimating problems, but they are nonetheless important in determining the supply of labor to individual occupations.

> The single most important component in determining the rate of growth of an occupation during any decade is the volume and direction of occupational transfers . Occupations which grow rapidly are those in which there is considerable occupational transferring . Large numbers of new entries from among youth who are entering the working force is not enough to insure the growth of an occupation. On the other hand the occupations which either grow slowly or decrease in size do so because of large-scale out-mobility rather than because youth do not enter them or because of retirements or deaths.
>
> These conclusions apply equally well to periods of prosperity and depression. During prosperous times, however, there is an increased volume of mobility . . . ; hence growing occupations increase more rapidly than in depression periods, and declining ones decrease faster than in less prosperous times. In short we may generalize by saying that the the numbers of new entries, of deaths and of retirements tend to be similar within each major occupational group during periods of presperity and depression. In contrast, the amount and direction of occupational transfers varies enormously and is of crucial importance in affecting the rate of growth of an occupation and changes in the rate of growth.[12]

The difficulties which surround efforts to estimate occupational transfers are of three types. First, direct measurement is extremely difficult, because the direct measurement of occupational transfers requires longitudinal cohort analyses, which are both expensive and time consuming. The result is an almost total lack of empirical data about occupational transfers.

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[12] A. J. Jaffe and R. O. Carleton, Occupational Mobility in the United States, 1930-1960 (N.Y.: Columbia University), 1954, p. 27.

The second major difficulty is posed by the fact that, at least to date, there has been no consensus about how much detail is desirable in defining occupations. The number of occupations analyzed therefore varies greatly from one study to another. The number of occupations in any particular study determines the definition of a change of occupations, and dictates the number of occupational transfers which can occur.[13] Occupational transfer data are therefore not usually transferable from one study to another.

Thirdly, there is the distinct possibility that patterns of occupational transfer differ from one area to another.

For these reasons, a generally useful methodology for estimating occupational transfers must be responsive to individual study areas and to the particular occupational classification system used in the study.

The methodology presented here makes certain assumptions which should be explicitly stated. It defines transfers to be a function of occupation and time, and in doing so assumes that rates of occupational transfer remain reasonably stable between the historical and forecast periods. It is true, as noted by Jaffe and Carleton, that occupational transfer rates are significantly affected by the business cycle.[14] Nevertheless, the stability assumption is probably not unduly restrictive if economic conditions in the historical and forecast periods are similar, and wholesale changes in occupational employment patterns do not take place in either period.

The methodology's applicability is limited to moderate forecast periods, but some of the other supply methodologies and most demand forecasting methodologies also lose much of their reliability when the forecast period moves much beyond five years. The reason for this limitation in the case of the occupational transfer methodology is that total out-transfers will not generally equal total in-transfers when the rates calculated from one occupational distribution are applied to a later and therefore different occupational distribution. The usual effect of this imperfect transferrability is that in-transfers will exceed out-transfers, since occupations showing positive transfer rates will be relatively larger in the forecast period than in the historical period, and occupations with negative transfer rates will be relatively smaller. The use of one period's transfer rates in a later period will therefore produce some excess in-transfers, for which an adjustment must be made.[15] The longer the forecast period, of course, the greater the required adjustment and the less useful the resulting data.

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[13] Ibid., pp. 35-37.

[14] Ibid.

The methodology's applicability is, of course, also limited to areas in which historical period data are available or can be constructed. While this is initially a serious restriction, it is not so once a continuing occupational forecasting program has been established in an area.

Despite the extensive data requirements and the limited forecast period for which this methodology is applicable, the methodology is one which is completely compatible with and complementary to the other supply forecasting methodologies presented in this handbook. In addition, it requires only a minimum effort, once the other supply and demand data are available.

Instructions for
WORKSHEET V-6: FORECASTING OCCUPATIONAL TRANSFERS

The first part of the methodology is the construction of historical occupational transfer rates.

Column I Occupation

Instructions: Insert the titles for all occupations in the study.

Column II Current Employment

Instructions: List employment in each occupation at the survey date.

Column III Past Employment

Instructions: List employment in each occupation at the beginning of the historical period.

Note: The length of the historical period should be the same as the forecast period. If it is not, adjustments must be made in the historical rates so that they are expressed in terms of a time period equal to the forecast period.

Column IV Expansion

Instructions: Subtract past employment (Column III) from current employment (Column II).

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[15] Ibid., p. 96.

WORKSHEET V-6: FORECASTING OCCUPATIONAL TRANSFERS

	Historical Period Demand				Change in Unemployment		
Occupation	Current Employment	Past Employment	Expansion	Replacement	Current Unemployment	Past Unemployment	Change in Unemployment
(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
TOTAL							
Occupation A							
Occupation B							
(etc.)							

WORKSHEET V-6: FORECASTING OCCUPATIONAL TRANSFERS (Cont.)

Historical Period Supply										
Institutional Vocational Training Graduates	On-the-job Vocational Training Graduates	School Drop-outs	Graduates of General Education Programs	Military Returnees	Labor Force Re-entrants	Net Geographic Work Force Migration	Historical Occupational Transfers	Occupational Transfer Rates	Forecast Transfers	Adjusted Forecast Occupational Transfers
(IX)	(X)	(XI)	(XII)	(XIII)	(XIV)	(XV)	(XVI)	(XVII)	(XVIII)	(XIX)

Column V Replacement

Instructions: List calculated replacements for each occupation for the historical period.

Column VI Current Unemployment

Instructions: List the current number of employment in each occupation as estimated in Chapter III, Section A.

Column VII Past Unemployment

Instructions: List the number of unemployed in each occupation at the beginning of the historical period.

Column VIII Change in Unemployment

Instructions: Subtract past unemployment (Column VII) from current unemployment (Column VI).

Note: Only the change in unemployment over the historical period is included in this calculation. A positive figure represents an increase in unemployment; a negative figure a decrease.

Columns IX-XV Historical Period Supply

Instructions: Enter the supply estimate for each supply source during the historical period.

Column XVI Historical Occupational Transfers

Instructions: For each occupation, sum expansion (Column IV), replacement (Column V), and the positive or negative change in unemployment (Column VIII); then subtract the supply produced by the other supply sources (Columns IX-XV).

Note: Positive numbers represent net transfers into the occupation; negative figures, net out-transfers.

Column XVII Occupational Transfer Rates

Instructions: For each occupation, divide occupational transfers (Column XVI) by past employment (Column III).

Column XIX Adjusted Forecast Occupational Transfers

Step 1: Sum the occupational in-transfers (or the occupational out-transfers) from Column XVI. Disregarding the sign, divide that total by total employment at the beginning of the historical period (sum of Column III) to get a "total" occupational transfer rate. Enter that figure on the total line of Column XVII. Apply that rate to total current employment (total line, Column II) to get adjusted total-in-transfers and adjusted total out-transfers. Enter on the total line of Column XIX.

Step 2: Adjusting Forecast In-transfers
Sum the forecast in-transfers appearing in Column XVIII. Divide the adjusted total transfers (total line, Column XIX) by that number to yield an in-transfer adjustment factor. Multiply the occupational in-transfer figures appearing in Column XVIII by the adjustment factor, and enter the adjusted occupational in-transfers in the appropriate line of Column XIX.

Step 3: Adjusting Forecast Out-transfers
Repeat the procedures described in "Step 2: Adjusting Forecast In-transfers."
Note: This process is necessary to equate in-transfers to out-transfers.

Section G

Summary Occupational Supply Tables

The data developed in the handbook are sufficiently detailed and sufficiently complete to warrant summarization into occupational supply totals for detailed occupations. Thus a tabulation should be prepared showing the supply available to each of the detailed occupations to be analyzed in the study. Such a tabulation will require a column for each of the supply worksheets used to estimate or allocate supply from the eight supply sources. (This tabulation can be prepared from Worksheet V-6.) This procedure is recommended as a way of making the analysis of detailed occupations a more systematic process.

Summarizations of the data into broad occupational categories for general analyses can also be readily made from such a tabulation.

APPENDIX

SOURCES OF POPULATION DATA FOR AREA MANPOWER REQUIREMENTS AND RESOURCES SURVEYS

Technical Report Number 2

by

Bruce McKinlay

MANPOWER RESEARCH PROJECT
Oregon Department of Employment
Eugene, Oregon

Preface

The draft of the Bureau of Employment Security's handbook, Area Manpower Requirements and Resources Surveys, provides a method for calculating overall labor force and youth labor force estimates from population data. It recommends the use of existing population estimates whenever those estimates are sufficiently detailed and sufficiently accurate for use in a manpower study, but in addition it provides a number of procedural options when they are not. For instance, if useable population estimates and forecasts, stratified by age and sex, are available, Worksheet 6 in the proposal simply provides for the calculation of labor force estimates. However, if estimates and forecasts of total population are available, but they are not stratified by age and sex, Worksheet 5 provides a method of stratifying the total population estimates preliminary to calculating the labor force. If either forecasts or current estimates of total population are lacking, there is a procedure for estimating current and future population also (Worksheet 7). The several options offered by this approach provide the procedural flexibility which is needed to accommodate the differences in available data among states and areas. The procedures outlined in the Handbook follow the methods conventionally used in estimating and forecasting population and labor force, and thus can be applied to most data series.

As part of the Manpower Research Project, the proposed aggregate supply methodology was applied to the project area, with maximum use being made of the Handbook worksheets. This effort made no direct use of the current estimates and forecasts which are available for the project area from local sources, since the primary purpose was to discover whatever procedural problems might exist in the proposal's methodology. The results of that effort are reported in Manpower Research Project Technical Report Number 1.

In addition to applying the procedures for making the various estimates, it seemed appropriate to discover how much information, both current and forecast, was already available about the population of the project area, and how much use could be made of it in an Area Manpower Survey. The findings of this latter effort are reported in this paper, along with some observations about the availability of similar information elsewhere in the country.

SOURCES OF POPULATION DATA FOR AREA MANPOWER REQUIREMENTS AND RESOURCES SURVEYS

The primary task of occupational job market information is to assess the supply and demand for individual occupations, but it is also important to appraise the more general relationship between the total labor supply likely to be provided by the population and the demand for labor generated by the economy. This more general assessment is important in two ways. First, it provides an important context for the interpretation of supply and demand figures for individual occupations. Secondly, a general comparison of labor supply and demand may have important policy implications in its own right.

Consideration of the sources of population data and their usefulness for manpower surveys is therefore relevant. This paper first describes the amount of information that is already available about population in the project area. It then attempts to give some perspective on the situation elsewhere in the country. Thirdly, it discusses a conceptual problem that raises serious questions about the usefulness of most population forecasts for manpower analyses.

Existing Population Data For The Project Area

In Oregon, population estimates are made annually for counties and incorporated cities by the Center for Population Research and Census, a state agency attached to Portland State College. The estimates are the basis for the distribution of certain state collected tax revenues to the various local governments. For the project area, these estimates of total population are available from 1956 to the present, thus providing an historical series as well as a useable current estimate. The annual estimates are not distributed by age and sex, however.

Population forecasts have been made for the project area in a number of recent studies. Four such studies were found to be in common use locally. These were in addition to the state forecasts produced by the U.S. Bureau of the Census. The four studies and the Census Bureau report are listed below, along with their forecast dates and the extent to which personal characteristics are included in the data.

Population Forecasts for the Eugene Metropolitan Area

	Area Covered		Base	Forecast Years	Distributed by
	State	Eugene SMSA	Year		Age & Sex
Oregon State Board of Census, "Population and Labor Force by Age and Sex (Release Number P-10)," April 1964	X	X	1960	1965, 1970 1975, 1980 1985	X
Bureau of Municipal Research and Service, "Population Forecasts: Lane County and Eugene-Springfield Area (Staff Report No. 4)," October 1, 1965		X	1960	1965, 1970 1975, 1980 1985	X
U. S. Bureau of the Census, "Illustrative Projections of the Population of States, 1970-1985 (Series P-25, No. 362)," March 7, 1967	X		1960	1970, 1975 1980, 1985	X
Pacific Northwest Bell Telephone Co., "Population and Household Trends in Washington, Oregon, and Northern Idaho, 1960-1985," March 1967	X	X	1960	1970, 1975 1980, 1985	X (sex only for counties)
Willamette Basin Task Force Economic Base Committee, "Willamette River Basin Economic Base Study," 1967		X	1965	1980, 2000 2020	X

A methodological review of each study is not appropriate here; it is sufficient to report that each of the studies was conducted independently, using accepted techniques for population estimating. The existence of an annual series of current population estimates, together with the number of forecasts already available for the project area, give rise to some optimism about the amount of data that might be found in other areas.

Existing Population Data for States and Areas

As would be expected, there is a considerable difference between the amount of data relating to current population and the extent to which forecasts are available. In the case of current estimates, there is a considerable amount of work being done. At the national level, the Census Bureau now prepares current estimates for the U.S., each of the states, and 38 large standard metropolitan statistical areas. In addition, they operate an expanding program of special censuses for small areas which are conducted at the request of, and with financial support from the area. During 1966 alone, the Census Bureau conducted 345 such special censuses; the results are published in their "P-28 Series."[1]

Even more work is done by state and local agencies and by private organizations. A 1965 survey of state and local agencies revealed some 66 state agencies and 118 local agencies in large S.M.S.A.'s engaged in population estimating. The survey discovered that "In all but one state, North Dakota, some State agency reported making population estimates for counties or other local areas."[2] The state of Kansas even goes so far as to conduct annual censuses, while Massachusetts takes them in years ending in five. Washington conducts censuses in selected areas and supplements them with estimates for other areas. This survey indicates that current population estimates are available for nearly all states from at least two sources, just as they are for the project area. A number of states provide age, sex, or racial characteristics of the state's population, and a few provide similar detail for counties. Some local agencies which make estimates for their areas also include personal characteristics of this type.

The availability of population forecasts is quite another matter, however. It appears that a fairly large number of agencies have devoted some efforts to forecasting, but many have not. Even the forecasts which are available from state and local agencies are of varying ages and geographic coverage. Evidently very few states are fortunate enough to have continuous efforts at population forecasting.

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[1] See U. S. Bureau of the Census, "Summary of Special Censuses Conducted by the Bureau of the Census Between January and December 31, 1966 (with Cumulative Summary of Special Censuses Taken Since April 1, 1960)," Series P-28, No. 1447, May 23, 1967.

[2] U. S. Bureau of the Census, Current Population Reports, Series P-25, No. 328, "Inventory of State and Local Agencies Preparing Population Estimates: Survey of 1965," p. 2.

A recent Census Bureau release sheds some light on the availability of projections from local agencies. Their "Bibliography of Population Projections for Local Areas" includes 169 projections published since 1961.[3] While it is obviously not an exhaustive list, it is probably complete enough to suggest the extent to which projections are available. The bibliography includes entries for 40 states plus the District of Columbia. From the list it appears that forecasts of total state population have been made in 31 states. In 17 of these states, forecasts have also been made for all the counties in the state. The other forecasts included in the bibliography are less comprehensive, covering selected S.M.S.A.'s, counties, or economic areas.

Despite the favorable situation in the project area, the evidence suggests that population forecasts are not generally available from state or local sources.

One comprehensive set of estimates is available from the Census Bureau in the form of illustrative projections for states.[4] This series employs varying assumptions about fertility and migration to project past population trends to future dates. This series includes no areas smaller than states. Moreover, these data are not intended as predictions, only as indications of the population distribution that would emerge were the various alternative assumptions to materialize. Consequently, even this series must be used with caution. There is a great deal of interest in population forecasting, both as to methodology and content. However, at this point it seems that existing forecasts suitable for area manpower analyses are the exception rather than the rule.

A Problem for Manpower Studies Inherent in Conventional Population Forecasting Methodologies

Although there are numerous ways in which population estimating can be approached, one particular method has come into common use.[5] This component method analyzes births, deaths, and migration separately, but the way in which it forecasts migration raises problems for manpower supply-demand comparisons.

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[3] U. S. Bureau of the Census, "Bibliography of Population Projections for Local Areas," August 1967.

[4] See U. S. Bureau of the Census, Current Population Reports, Series P-25, No. 375, "Revised Projections of the Population of States, 1970 to 1985."

[5] For a general discussion of population estimating methods, see Walter Isard, Methods of Regional Analysis: An Introduction to Regional Science, Mortimer Spiegelman, Introduction to Demography, Dennis W. Wrong, Population, or some other standard reference.

Essentially, the method starts with a known distribution of the area's population by age, sex, and sometimes race. (The most recent decennial census is frequently used.) The number of persons surviving to the current or forecast date from each cell in this distribution is then calculated by the use of standard mortality tables. Births are estimated by applying age-specific birth rates to the number of women of various ages in the population. Survival rates are then applied to these birth estimates to yield an estimate of infants at the current or forecast date. This "cohort survival" technique yields an age-sex distribution of the resident population expected to survive to the current or forecast date.

The treatment of migration is more difficult, because data are not available for direct estimation. The procedures for making migration estimates between the bench mark date and the present differ from those used to forecast migration over some future period. The allowance made for migration in constructing a current estimate is usually based upon the pattern exhibited by some cohort, such as school aged children, for which migration can be calculated.[6]

Forecasting migration presents even more serious problems, since migration patterns change erratically over time. Migration is known to have a host of causes, one of the principal being the pull of economic opportunity. For purposes of forecasting migration, economic opportunity is frequently assumed to be the overriding consideration, and the migration estimate is determined by it. In this technique, independent forecasts of employment are combined with an assumed unemployment rate to derive an estimate for the labor force. Labor force participation rates are then used to build an estimate of the population that is likely to be supported by the local economy. The difference between this population estimate and surviving resident population is considered to be migration. If the economic projection of population exceeds the number of resident survivors, in-migration is projected to make up the difference; if it is less, out-migration is projected.[7]

This residual approach was used in all four of the locally produced studies mentioned earlier, but for the purposes of a manpower survey, it obscures the crucial question. The question with which a manpower survey is concerned is essentially, "Under the most probable economic trends, will labor supply and demand be in balance?" By assuming a given unemployment rate and given labor force participation rates, this forecasting method assumes that no adjustment occurs in the labor market, and that imbalances are accounted for exclusively by migration. Deriving migration estimates in this way, or using estimates derived in this way, focuses attention on population movements rather than on the labor market trends with which a manpower survey is principally concerned.

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[6] For a step by step explanation of a current population estimating procedure, including this approach to estimating migration, together with comments, see U. S. Bureau of the Census, "Methods of Population Estimation: Part I, Illustrative Procedure of the Census Bureau's Component Method II" (Series P-25, No. 339, June 6, 1966.)

[7] This is an extremely simplified statement of population estimating methodology. Its actual application to an area requires the inclusion of many more details and special treatment of atypical population components such as university students or military personnel.

An interesting and perhaps useful alternative is to estimate migration by using trend analysis rather than employment demand. This is the approach used by the Census Bureau. Such a method projects migration estimates on the basis of past experience, thereby assuming that the forces affecting migration will continue in the future in the same way as in the past. This assumption may ignore important changes anticipated during the forecast period; nevertheless, it does provide an alternative to the employment demand technique, and it does focus the analysis on the labor market rather than on population movement.

In the Willamette Basin Study described earlier, both methods were used to make population projections for 1980, and the resulting estimates proved to be nearly identical.[8] Such similarity suggests in part that the employment, unemployment, and labor force participation rate estimates used in the employment demand technique were calculated to follow historical trends rather closely. Nevertheless, the similarity of results in this case makes their reconciliation a practical possibility. Despite its obvious limitations, the trend approach does yield an additional point of reference for population forecasting, and it is particularly relevant to manpower studies because it provides a point of reference which does not assume that all adjustment to change takes place outside the labor market.

Conclusions

Population estimates are an important component of a comprehensive manpower study, because population and labor supply are so closely related. However, constructing population estimates and forecasts is at least as technically demanding and time consuming as employment estimating, so manpower analysts are well advised to use existing population data whenever possible.

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[8] For the Willamette basin from Eugene to Portland, in addition to changes caused by births and deaths, "...net in-migration during the 1965-1980 period is projected to add 13,620 annually, which was the average annual level attained during the 1940-1964 period. Net in-migration at this assumed level would increase the total population an additional 198,900. The resulting demographic projection would be 1,764,300 compared to the economic projection of 1,767,500, a difference of two-tenths of one percent." Willamette River Basin Economic Base Study, p. G-16.

Estimates of current population are available for most labor market areas in the country, often from more than one source. In all probability such estimates will be found to be satisfactory for manpower analyses. On the other hand, recent population forecasts appear to be scarce. Moreover, there are severe conceptual problems in the commonly used residual method of forecasting migration, which further limit the applicability of many forecasts for the purposes of manpower analyses.